"We're in a solid year, even if not a boom period," says Andrew M. Kennedy Jr., vice president, purchases and traffic, Westinghouse Electric Corp. He's one of many metalworking executives being checked by STEEL editors in their air safari to find the temper of today's business. See Page 95

STEEL

The

Metalworking Weekly

MAY 9, 1960

A PENTON PUBLICATION

The Railroads Are Fighting Back

How Singer Sews Up World Markets

New Plastic Pattern Technique Improves Ceramic Shell Molding

Potential for Rare Earths Widened

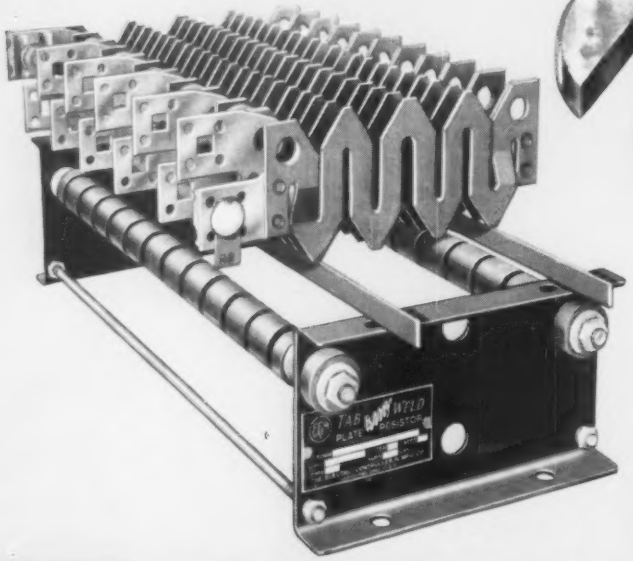
CONTENTS—TURN PAGE

HANDS OFF!

EC&M TAB-WELD RESISTORS REQUIRE *MINIMUM* MAINTENANCE

Only EC&M TAB-WELD PLATE RESISTORS are both bolted and welded for constant current path Unlike other resistors, they do not require periodic tightening of clamping nuts to compensate for loss of pressure caused by alternate heating and cooling. Grids are offset and mating ends are spot welded. Tap-plates are also welded into place at close intervals along the grid assembly.

This exclusive EC&M construction offers 4 big advantages on heavy duty motor applications: (1) stabilized ohmic value (2) no burning at grid-eyes or at tap-plates (3) easy tap-shifting for best motor performance and (4) long life with virtually no maintenance!



FEATURES THAT REALLY COUNT!

- Nonbreakable
- Corrosion-resistant alloy steel
- Negligible resistance change between cold and maximum working temperatures
- Offset resistor ends spot-welded
- No burning at grid-eyes
- No burning at taps
- Small adjustments in resistance value easily made
- Insulating spacers remain dimensionally stable
- No periodic tightening of clamping nuts
- All standard sections same size
- Double insulation to ground
- Fast connection to any tap-plate

Write for illustrated Bulletin 6715
Complete data on EC&M TAB-WELD RESISTORS

SQUARE D COMPANY

EC&M DIVISION • CLEVELAND 28, OHIO

wherever electricity is distributed and controlled

7404-R

This Week in STEEL

The Metalworking Weekly

May 9, 1960 Vol. 146 No. 19

Crosscurrents Appear in Business Picture

On a coast-to-coast air safari to check metalworking's business pulse, STEEL's editors covered the lower Great Lakes area. Most managers are uncertain about second quarter prospects, but generally feel that 1960 sales will exceed those of 1959. Here, the management team at Surface Combustion Div., Midland-Ross Corp., Toledo, gathers to give STEEL a full report on the firm's outlook. Seated, from left: G. J. Langenderfer, sales manager, Heat Treat Div.; D. K. Martin, sales manager, Steel Mill Div.; A. L. Hollinger, vice president-sales; H. M. Heyn, vice president of Midland-Ross and general manager of all Surface divisions. Standing: E. P. Heiles, vice president of Midland-Ross and general manager, Surface Combustion; H. W. Bluethe, manager of advertising and sales promotion.

PAGE 95

How the Railroads Help Themselves

The carriers are trying to get back on the tracks to revenue with dieselization, piggybacking, new maintenance and management efficiencies. Operating time and costs are being cut with electronic yards and new atomic techniques; management is setting new performance standards.

PAGE 98

How Singer Sews Up World Markets

This established U. S. producer has managed to remain synonymous with sewing machines throughout the world although it lost a big chunk of domestic business to foreign competitors. Here's how the company keeps a tight grip on world markets and sells wares in its toughest competitors' backyards.

PAGE 105

New Technique Improves Ceramic Shell Molding

The use of plastic patterns in precision casting has been limited to flask type molds, but Precision Metalsmiths Inc., Cleveland, has solved the problem of using plastic with ceramic shell molds. The method cuts mold costs, handling time, and the amount of cleaning required. In this exclusive interview with STEEL, Robert R. Miller, president of Precision Metalsmiths, tells how the new process can cut the cost of investment castings as much as 30 per cent. For prototype work, patterns can be machined from solid plastic before the user goes to the expense of making dies.

PAGE 140

Potential for Rare Earths Widened

Watch for the 17 tongue twisting members of the rare earth family to burst into maturity under the impetus of processing refinements and lower prices. The potential looks particularly bright in steelmaking, aluminum and magnesium alloying, thermal electric, and possibly atomic applications. Availability is great enough to meet any foreseeable demand.

PAGE 179

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STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

Special fastener does it better at half the cost

OLD BOLT

The sleeve-type bolt was used as a steel strapping handle for railroad cars. Not only was the weld expensive, but the part had inadequate strength for the holding of heavier loads.

NEW BOLT

Bethlehem fastener engineers designed this forged-eye bolt. A greatly increased strength resulted from both the new design and the use of a heavier material . . . *at half the cost of the old style bolt!*

Our ability to redesign fasteners is just one example of how our fastener engineers can study your problem. Perhaps a minor change—or a completely different design—can do your job better . . . and at lower cost. Bethlehem makes just about every type of steel fastener specialty—forgings, rods, bolts, nuts, and stampings.

Just send us a rough pencil sketch or drawing of the part you need, indicating dimensions. After our fasteners engineers have studied it, we'll give you our honest appraisal of what we can do for you. If we can't recommend a practical solution, we'll say so. But if we can help you, and you are fully satisfied with our estimate, we're prepared to give you fast delivery. Just phone our nearest sales office.

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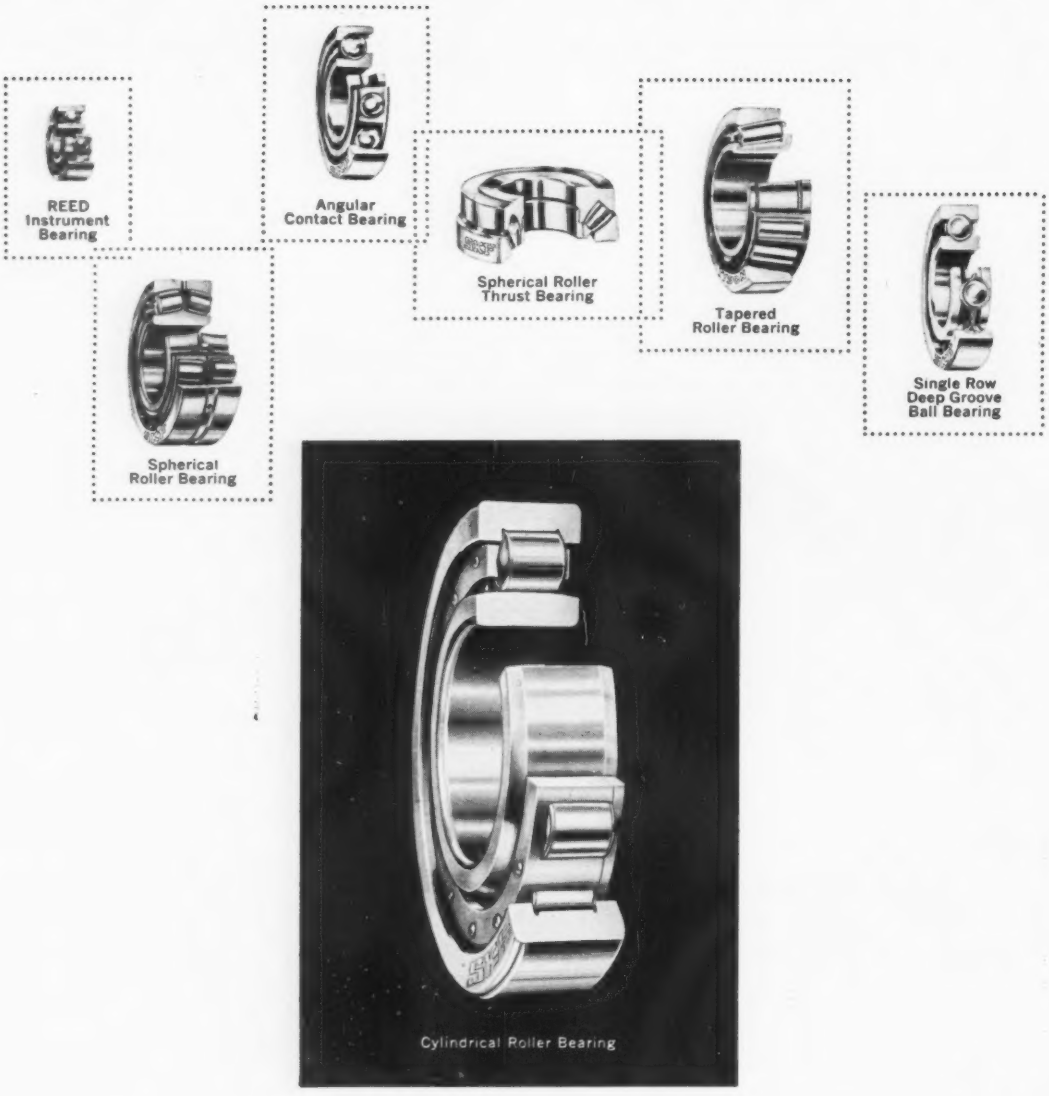
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL



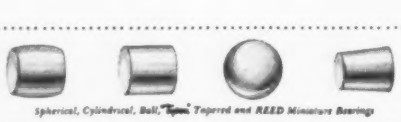
What's a "special size" in production bearings?

SKF makes so many standard sizes, there's practically no such thing as a "special size" of bearing. They range from tiny instrument bearings right up to four-row tapered roller bearings—and account for almost every possible bore size in-between.

Take SKF's standard cylindrical roller bearing, for example. It's promptly available in 154 sizes of single- and double-row types —for shaft diameters ranging from 1" to 9.5". Every size, in both types, offers high radial capacity in relation to its size and operates at highest speeds because of its very low friction.

So, before you specify a "special size" bearing, call the nearest SKF sales office first. The odds are better than 1,000 to 1 that there's already a standard SKF bearing of exactly the size you need. 6007

See them at the SKF Booth #1932 at the Design Engineering Show



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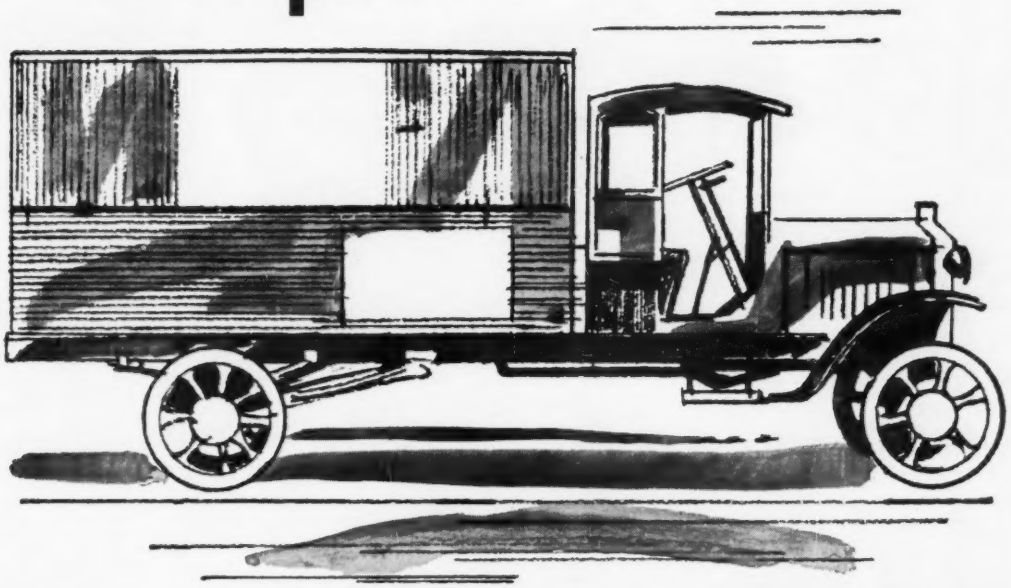


You can't afford to deliver your goods in obsolete equipment; that would be poor economy and tough on your name.

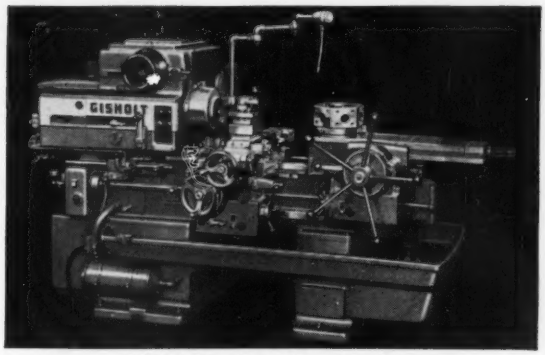
But what about obsolete production equipment? It's out of sight, but it delivers a far greater loss in wasted time and manpower, excessive unit costs and reduced quality.

You might be surprised how easy it is to turn these losses into profits with the many production advantages of a modern Gisholt Turret Lathe.

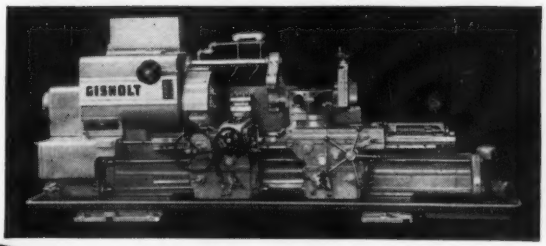
Here is the capacity with the versatility you need to cut critical unit costs on a wide variety of tough jobs. Here is the easy operation you need with the easy setup to minimize tooling and change-over time. Here is the extreme accuracy you need to maintain closest tolerances and highest quality. Here is the extra power with the rigidity to take full advantage of modern cutting tools.

Here are all the advantages you need to keep ahead of demands for higher, faster production and lower costs.

Ask your Gisholt Representative about Gisholt Ram and Saddle Type Turret Lathes—how they can be put to work in your plant earning extra profits, paying for themselves. Call him today or write for literature.



Gisholt Ram Type Turret Lathe



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COUNTER
Series 1205 Panel mounted counter. Speed: 1000 cpm, 6 figures
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Counting flat sheets with limited space between
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New Counting Flexibility

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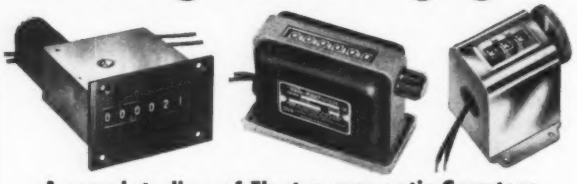
Veeder-Root Electro-magnetic Counters provide new and simplified methods for count-rolling all types of plant operations.

These counters are actuated electrically by a variety of methods as shown above, making them completely flexible in application. These methods include non-contact probes and photo-cells, miniature switches and built-in "make and break" or standard contact switches. In addition, these electro-magnetic counters can be easily remoted — at any distance — to office locations or for centralized production control.

Send for complete information on Veeder-Root Electric Counters . . . Take advantage of the many new opportunities for improved and simplified counter application, possible only with this Veeder-Root line.

Standard models available from your Veeder-Root Industrial Distributor; or write direct for help on specific problems.



A complete line of Electro-magnetic Counters

Series 1591 — Quick reset, high speed counter. Speed: 3000 cpm. Extra long life. 4 or 6 figures.

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Series 1507 — Small Reset Counter for base or panel mounting. Speed 700 cpm. 3 or 4 figures.

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1958

1960

NEWS OF IMPORT!

An
Account of the
Origins of
STEEL

The Metalworking Weekly
and
Its Evolution from a Small Magazine Called *THE TRADE REVIEW*

1940

1950

1920

1930

1900

1910

1880

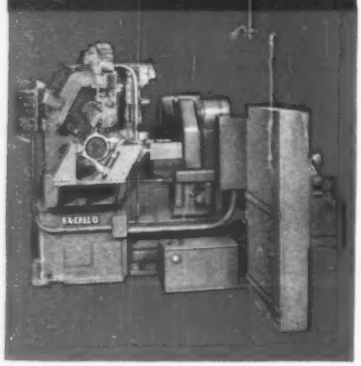
1890

For years, the younger editors have thought STEEL was founded in 1882. 'Tain't so. We found copies from 1880 reposing in the Cleveland Public Library (an air conditioned sanctuary that attracts editors to do research—especially on the opening day of the baseball season). In one 1884 issue, the editor, in modesty, said: "*The Iron Trade Review* enters upon the seventeenth year of its existence. It is healthy." That means STEEL's forebearer, *The Trade Review*, later named *The Trade Review & Western Machinist*, and subsequently, *The Iron Trade Review*, was born in 1868. Trouble is, we don't have the first issue that was cranked off the early flat-bed press. We'll gladly make an honorary editor out of the man who comes up with that first issue.

The magazine's dress, as well as its name, has evolved throughout the years, just as have men's fashions. In the Jan. 10, 1880, issue, we discovered a display advertisement by Lehman, Richman & Co., better known today as Richman Bros. Co., Cleveland. Richman's has been a manufacturing retailer of men's apparel since 1879 and we obtained suitable photos from the company that depict what the fashionable metalworking manager might have worn through the decades. You'll find them adjacent to the photos of front covers which show pivotal years in STEEL's development.

Back in the early days, the nameplate proclaimed: "A Journal of Manufactures, Commerce, Industry, Science, Art, and Invention . . . In the

Step-by-Step Automation with Ex-Cell-O Specials



Your first step into automation may cost much less than you think. In medium-sized shops, for example, a profitable, automated set-up may involve the purchase of a relatively simple transfer machine, such as the one illustrated above, consisting of two standard way-type units. Or, even more simply, a single standard machine which easily fits into automated set-ups later on.

In any case, a host of Ex-Cell-O engineers, laboratory technicians and production specialists are at your service. *No obligation whatsoever.* Call your Ex-Cell-O Representative or write Ex-Cell-O, Detroit.

SEND FOR FREE BROCHURE

This 20-page catalog will show you the most profitable way to put automation into your present operations—make your own "Automation Appraisal." Ask for Bulletin 50155.

XLO EX-CELL-O FOR PRECISION

57-88

EX-CELL-O CORPORATION DETROIT 32, MICHIGAN

Servicenter

1890s, the line read: "A Journal of the Iron and Steel Industry, The Machinery Trade, and Kindred Interests" . . . In 1930, the publication's name was changed to STEEL. The thinking: We had passed through the iron period, and steel was holding sway in metalworking . . . After Jan. 1, 1951, advertising was dropped from the covers.

Enough of this woolgathering about the past. The editors believe their special province lies in looking ahead, so we turn to the Sixties.

In our Apr. 11, 1960, issue, you witnessed another change—with emphasis on The Metalworking Weekly. (See front cover.) Shrdlu says: "If the nations of the world keep playing around with $E=MC^2$, the editors may be chiseling words in stone tablets." In any event, we're in business to serve you—and to serve you effectively, we must change with the times. We hope you approve.

A STEEL First

STEEL EXCLUSIVE

Those words are pure heaven to an editor's ears. The scope and rapidity of modern communications stress the need for getting the news fast. Beating the competition with a news or technical article is a mighty tough job. With this issue, we're introducing the artwork which you see above. It's called a "bug" in the argot of the trade. Whenever you see it from now on, you'll know that STEEL's editors have scored a news beat.

This week, it adorns Metallurgical Editor Ed Case's article about a process which utilizes plastic patterns in ceramic (shell) investment castings. Ed found the story, developed it, and it's served up to you in our technical section.

You Can Win $1000 This Month . . .

. . . in STEEL's Usership Idea of the Month Contest. Tell us, in 300 words or less, how you plan to USE an article or advertisement in this issue (or any other issue published this month—May, 1960) to help you accomplish an important personal or company objective. Be as specific as you can. If, in the opinion of the judges, yours is the best idea submitted—you will win $500.

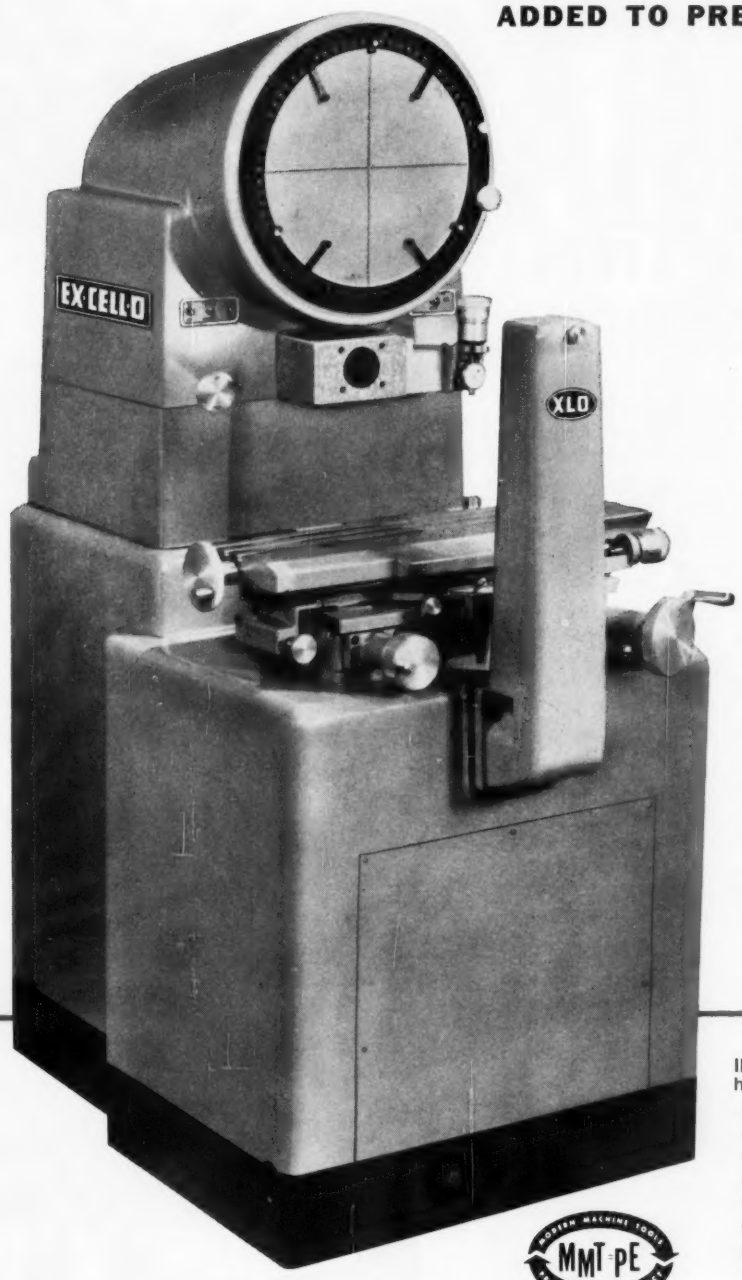
There's more . . . You will win an additional $500 if you furnish written proof that you were successful in accomplishing your objective. Proof must be submitted within six months after you are declared winner of STEEL's Usership Idea of the Month Award.

You can enter as many times as you wish. Please identify your letters as Usership entries. They will be judged by a committee of STEEL's editors. All letters become STEEL's property.

Send your entries to me, Ed Service, Servicenter, STEEL, 1213 W. Third St., Cleveland 13, Ohio. Deadline for this month's contest is July 1, 1960.

NOW — CONTOUR PROJECTORS FROM EX-CELL-O!

FORMER KODAK® OPTICAL PROJECTORS ADDED TO PRECISION GAGING LINE



Precision Contour Projectors, formerly manufactured by Eastman Kodak Company, have been added to an expanded line of gaging and inspection equipment from Ex-Cell-O. They are sold and serviced by Ex-Cell-O's subsidiary, Optical Gaging Products, Inc.*

Ex-Cell-O Contour Projectors are available in six table and console models for measuring and inspecting parts ranging in size from the smallest watch springs to huge breech blocks, with accuracy to .0001".

Features: Kodak Ektar® highest quality optics; finger-tip controls; vertical or horizontal projection; wide selection of lenses; maximum staging space and table travel; screen sizes from 8" to 30"; and rugged, precision construction.

Contact your Optical Gaging Products, Inc. Representative.

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*26 Forbes Street, Rochester 11, N. Y.

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MODERN MACHINE TOOLS
PRODUCTION EFFICIENCY

Illustrated Model 14-5 is designed for large, heavy parts. Standard features include:

- 14" screen with full-width brilliance.
- Extra-large, 26" x 8" heavy-duty work table.
- Built-in helix table.
- Full 17½" throat clearance.
- Six magnifications from 10X to 100X.
- Protractor ring for measuring image angles.
- Vertical and horizontal measuring attachments, each with dial indicator and .0001" micrometer.

EX-CELL-O FOR PRECISION

Machinery Division

EX-CELL-O PRECISION PRODUCTS INCLUDE: MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • TORQUE ACTUATORS • GAGES AND GAGING EQUIPMENT • GRANITE SURFACE PLATES • ATOMIC ENERGY EQUIPMENT • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

60-50

EVEN ON THIS EXTRA-TOUGH JOB...

N-A-XTRA

HIGH-STRENGTH STEEL TRIPLES TRUCK LIFE!

Hour after hour, around the clock, the Edward C. Levy Slag Company, Detroit, keeps forty 45-ton trucks working under severe conditions. Nearly 30 tons of hot slag are loaded, lifted and dumped on every trip. Each time, the truck body must stand the sudden shock of drop loading, the stress of lifting that load and the grinding abrasive action as it empties.

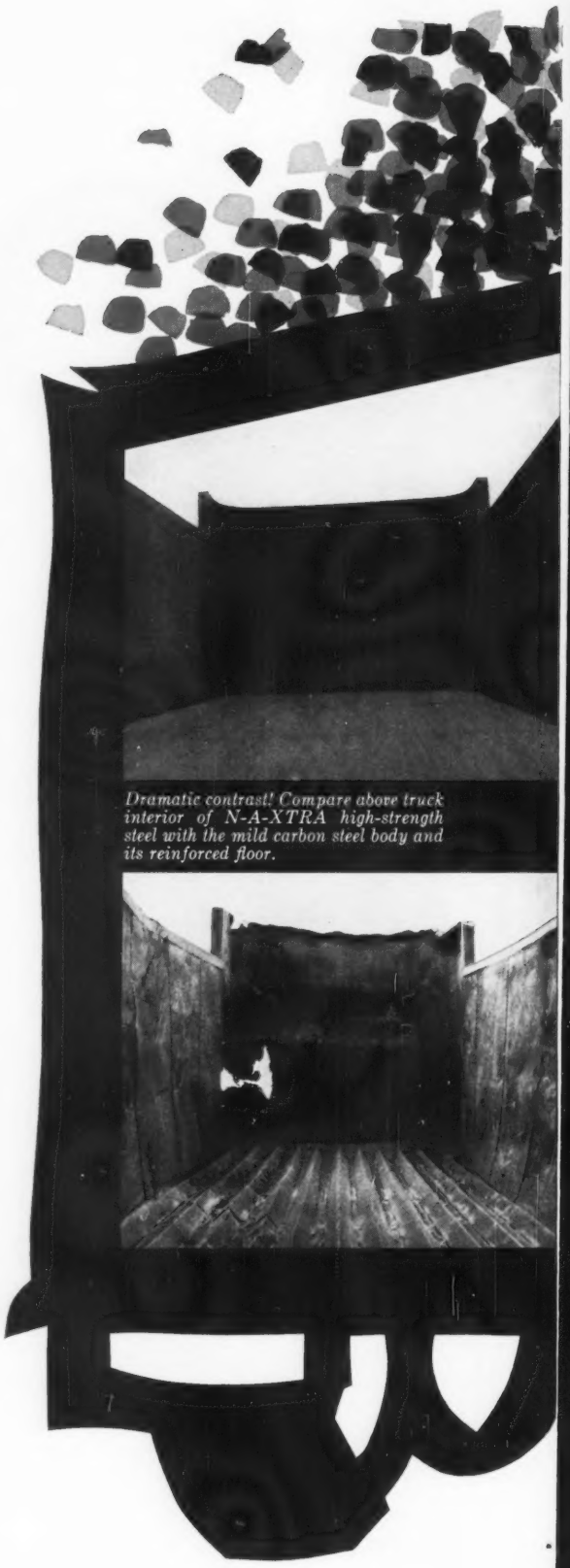
How long can a truck body take such a beating?

Until the company (which designs its own trucks) discovered N-A-XTRA high-strength steel, they used ordinary carbon steel, good for about 18 months' service. Though the truck bodies were as strong as they could be and still carry an adequate payload, maintenance was almost continuous—with breaks, dents, dings and sags occurring almost from the start.

Then they fabricated eight bodies out of N-A-XTRA, which has a minimum yield strength nearly three times greater than mild carbon steel. These trucks carry the same payload and after 18 months' service still look almost new. Owners estimate a life of five years, more than triple the others—with far less maintenance. The extra strength of N-A-XTRA also permits a strong floor that needs no expensive reinforcement to support the load against hydraulic lift action.

Eventually, all forty Edward C. Levy trucks will be made of N-A-XTRA high-strength steel. In fact, all patches and section replacements are now made with N-A-XTRA.

Tons of hot, abrasive slag may not be your problem—but the same steel that mastered these conditions is the one to remember when only the strongest steels will do. Rugged conditions, heavy loads and weight-saving construction are challenges that N-A-XTRA is designed to meet and beat. With excellent weldability, formability and toughness, these quenched and tempered N-A-XTRA steels are available in four levels of minimum yield strength, from 80,000 to 110,000 psi. They can also be supplied to higher levels of mechanical properties.



Dramatic contrast! Compare above truck interior of N-A-XTRA high-strength steel with the mild carbon steel body and its reinforced floor.

N-A-XTRA

A PRODUCT OF

GREAT LAKES STEEL

Detroit 29, Michigan

These two trucks have done the same tough work for 18 months. The only difference is that the one above is made of N-A-XTRA.

DESIGN NOTE:

Panels and floors for these trucks, designed by Edward C. Levy Slag Co., were fabricated of N-A-XTRA 100 (100,000 PSI minimum yield strength) from plates 3/16"-1/2" thick. Standard flame cutting procedures were used. Side frames were cold-formed of N-A-XTRA 100 from 3/16" plate, using both skip (6" weld, 6" skip) and continuous welds. Performance to date has been equal, indicating additional savings through skip welding.

For full technical information on N-A-XTRA high-strength steels, write Great Lakes Steel Corporation, Detroit 29, Michigan, Dept. B-9.

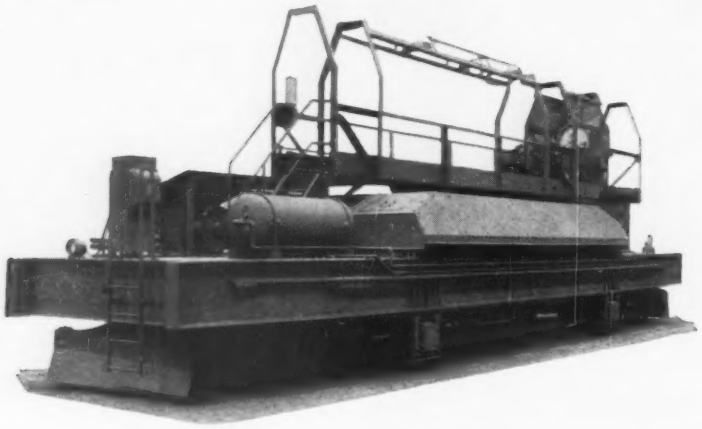
***Great Lakes Steel is a Division of* NATIONAL STEEL CORPORATION**

STOCK HOUSE OR HIGH LINE

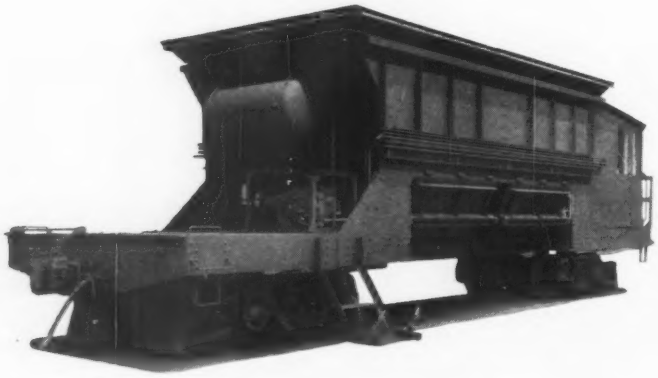
operators prefer the

DEPENDABILITY OF ATLAS CARS

These specially designed units are another example of the ruggedness of Atlas Cars. Their dependability helps maintain the most rigid furnace charging cycles.



40-TON SCALE CAR
Double Hopper Bottom Dump



75-TON ORE TRANSFER
Gable Bottom Double Side Dump

THE ATLAS CAR & MFG. CO.
ENGINEERS MANUFACTURERS
1140 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

CALENDAR
OF MEETINGS

May 9-10, International Acetylene Association: Annual meeting, St. Francis Hotel, San Francisco. Association's address: 30 E. 42nd St., New York 17, N. Y. Secretary: L. G. Matthews.

May 9-11, American Management Association: Special personnel conference, LaSalle Hotel, Chicago. Association's address: 1515 Broadway, New York 36, N. Y.

May 9-12, Instrument Society of America: Instrument-automation conference and exhibit, Civic Auditorium and Brooks Hall, San Francisco. Society's address: 313 Sixth Ave., Pittsburgh 22, Pa. Executive director: William H. Kushnick.

May 9-12, Society for Nondestructive Testing: Semiannual meeting, Baker Hotel, Dallas. Society's address: 1109 Hinman Ave., Evanston, Ill. Secretary: Philip D. Johnson.

May 9-13, American Foundrymen's Society: Castings congress and exposition, Convention Hall, Philadelphia. Society's address: Golf and Wolf Roads, Des Plaines, Ill. General manager: W. W. Maloney.

May 9-13, American Society for Metals: Southwestern Metal Congress and Exposition, State Fair Park, Dallas. Society's address: Metals Park, Novelty, Ohio. Managing director: Allan Ray Putnam.

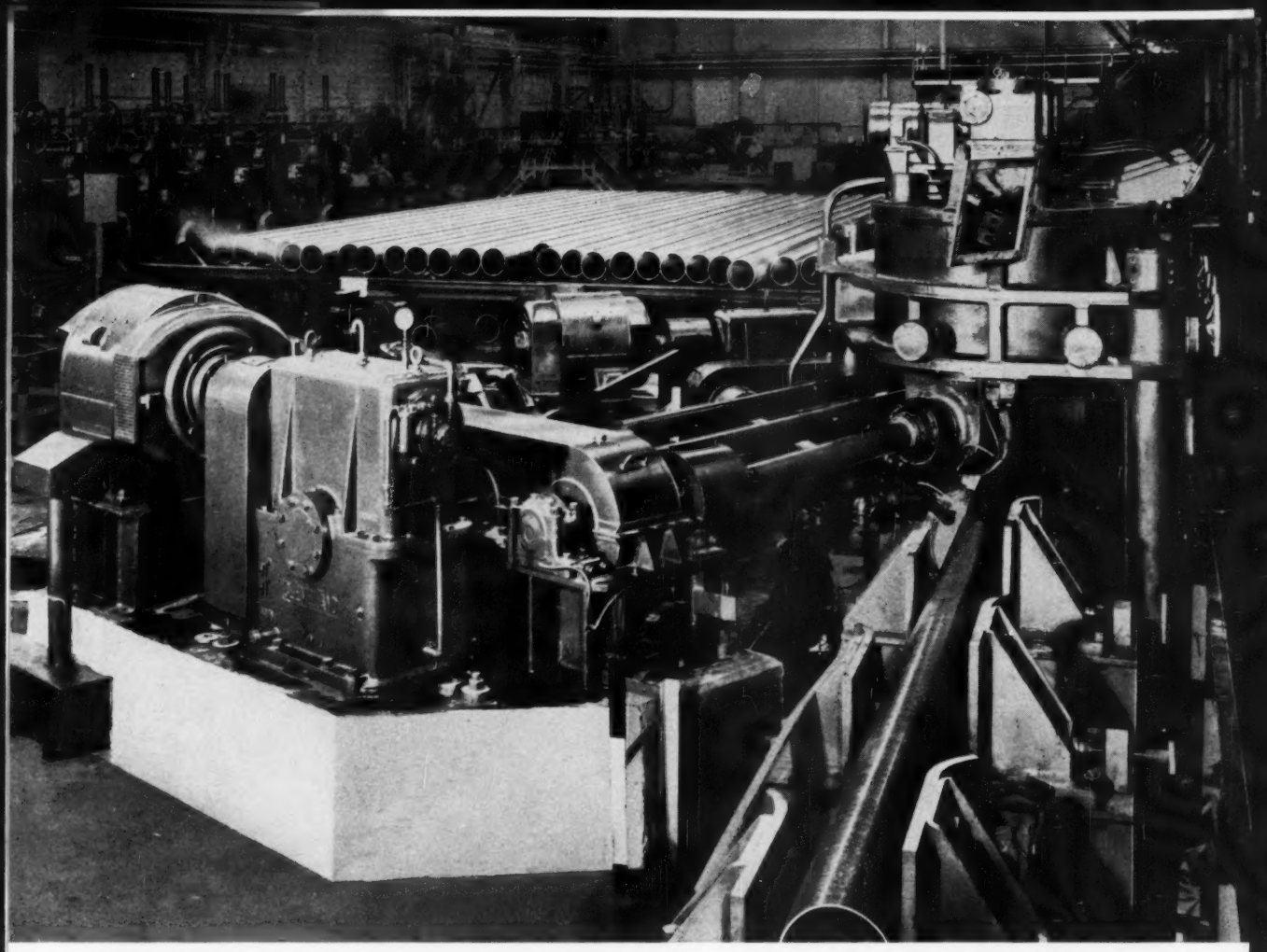
May 11-14, Machinery Dealers' National Association: Annual meeting, Edgewater Beach Hotel, Chicago. Association's address: 1346 Connecticut Ave. N.W., Washington 6, D. C. Executive director: R. K. Vinson.

May 12-13, American Management Association: Special marketing conference, Drake Hotel, Chicago. Association's address: 1515 Broadway, New York 36, N. Y.

May 15-18, Copper & Brass Research Association: Annual meeting, Homestead Hotel, Hot Springs, Va. Association's address: 420 Lexington Ave., New York 17, N. Y. Managing director: Theodore E. Veltfort.

May 15-18, Steel Service Center Institute: Annual meeting, Fontainebleau Hotel, Miami Beach, Fla. Institute's address: 540 Terminal Tower, Cleveland 13, Ohio. Executive vice president and secretary: Robert G. Welch.

May 17-19, American Society of Mechanical Engineering: Production engineering conference, Schroeder Hotel, Milwaukee. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.



How to straighten the really big pipe!

One major Eastern steel producer has found the answer – the big Mack-Hemp Model A-5 Straightener shown above – the largest of its type in the world!

This A-5 takes really big bowed pipe from the sizing mill, pulls it in through three pairs of opposed cross rolls and then spins it out straight and round to high tolerances in only a single pass.

This despite the fact that the steel pipe being straightened is 16-inch in diameter, fifty feet in length!

To do a job like this, of course, the massive 85-ton roll frame is a must, as are the heavy duty rolls, and the combined 200 HP motors used to drive all six of them. In its first year, this Mack-Hemp A-5 straightener has handled more than 200,000 tons of pipe.

If straightening pipe or tubing is your problem – any size, any alloy – consider doing it yourself. The men from Mack-Hemp will be glad to give you all the facts you'll want to know.

MACKINTOSH-HEMPHILL
Division of E. W. BLISS Company
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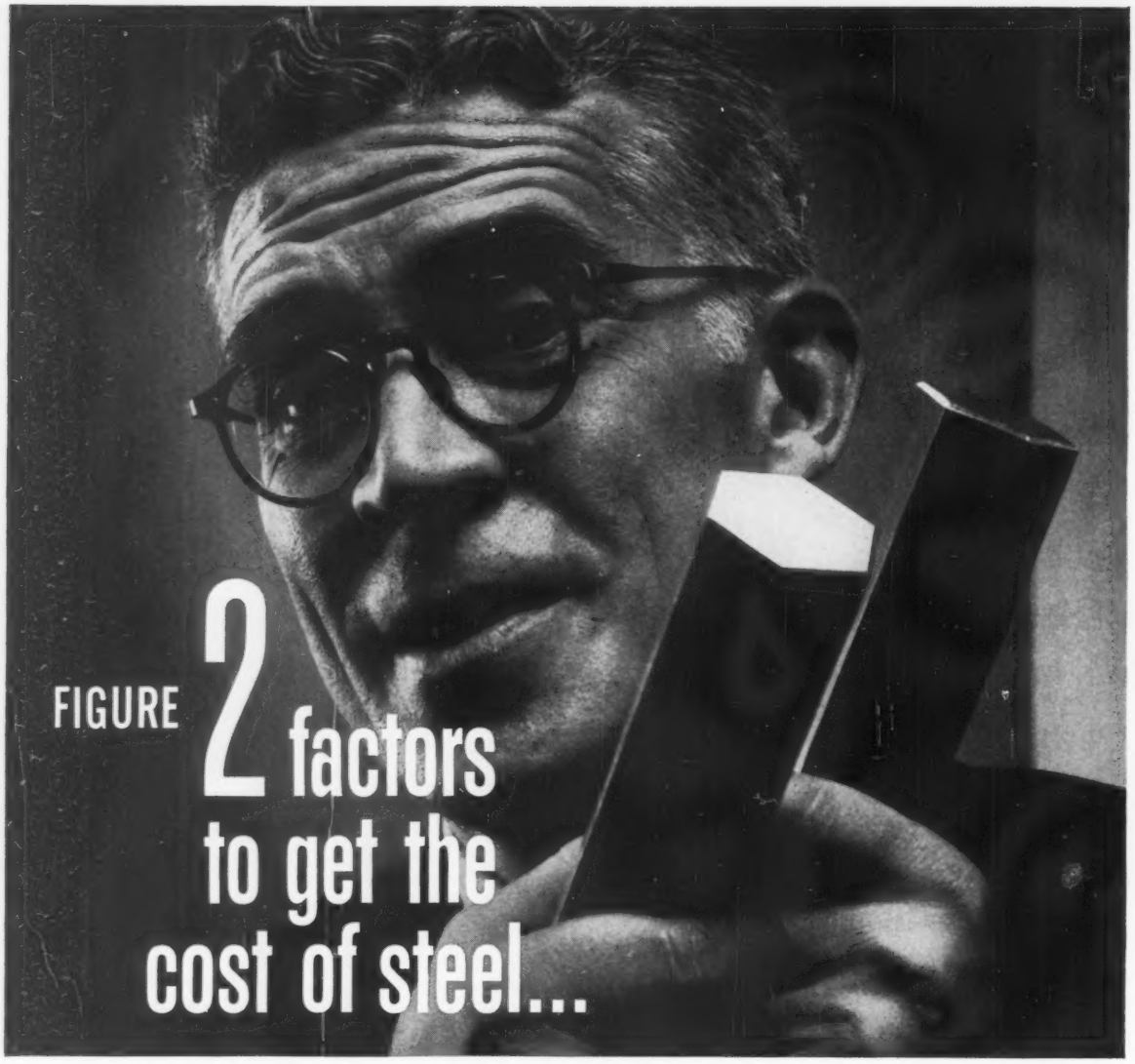


Price and the **COST OF POSSESSION!**

If you don't figure the two, you won't have a true picture of your steel costs.

Many smart, informed steel users save money by drawing on the inventory and facilities of their Steel Service Centers. They get technical assistance. And they get steel when they want it, delivered, cut-to-size, ready for production.

This means less capital tied up in inventory. It saves costs of space. Operating costs for storing, handling, cutting are reduced. Tax and insurance costs are kept to a minimum.

Compare all your costs of inventoried steel with the cost of steel delivered as needed. Use the chart at the right. For more information, get the booklet, *What's Your Real Cost of Possession for Steel?* from your nearby Steel Service Center. Or write to Steel Service Center Institute, Inc., 540-G Terminal Tower, Cleveland 13, Ohio.

STEEL SERVICE CENTER INSTITUTE

...YOUR STEEL SERVICE CENTER

COST OF POSSESSION FOR STEEL IN YOUR INVENTORY

Per ton delivered	_____
Cost of capital:	
Inventory	_____
Space	_____
Equipment	_____
Cost of operation:	
Space	_____
Materials handling	_____
Cutting & burning	_____
Scrap & wastage	_____
Other costs:	
Obsolescence	_____
Insurance	_____
Taxes	_____
Accounting	_____
TOTAL	_____

COST OF FREEDOM-FROM-RISK STEEL FROM YOUR STEEL SERVICE CENTER

Per ton, cut-to-size, and delivered

TOTAL_____

POSITIVE DUPLICATION—EVERY TIME!

One animal makes tracks like these, a pattern that is positively duplicated only by the grizzly bear. And only Cincinnati offers you the Positive Duplication of these SWING FRAME WHEELS, and of *all* CINCINNATI (PD) °SNAGGING WHEELS.

HOW WE ACHIEVE "PD"

To produce wheels of unsurpassed uniformity, Cincinnati developed a unique manufacturing process. It involves 36 separate quality controls, from formula blend to final inspection. For example, cams for temperature control of drying ovens must pass regular tests for accuracy, and checking procedures never vary.

HOW UNIFORMITY HELPS YOU

One big advantage of CINCINNATI (PD) WHEELS is—longer wheel life. Using (PD) WHEELS you get costs down and *keep* them down, because each reorder wheel will act and grind exactly like the original. This is the promise—and *performance*—of Positive Duplication.

CUT COSTS . . . CALL CINCINNATI

Our factory representatives are trained specialists, experienced in snagging and grinding operations. Their skills are at your service. Just call your CINCINNATI (PD) GRINDING WHEEL Distributor, or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

(PD) POSITIVE DUPLICATION

CINCINNATI
GRINDING WHEELS

°Trade Mark Reg. U.S. Pat. Off.

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

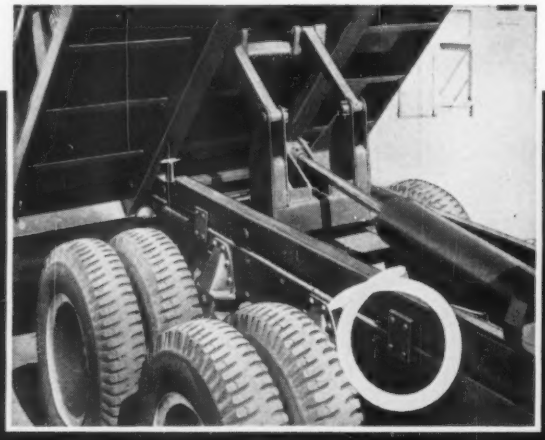
NYLOK NUTS GRAB HOLD... LOCK TIGHT

Vibration and heavy loads can't shake them loose

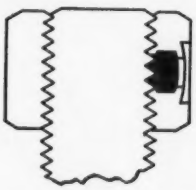
Put tons of load in a dump body, hoist it up, slam it down. Drive the truck over rough, jarring terrain. Still Republic NYLOK® Nuts hold tight—grip with a positive lock to anchor Heil Dump Bodies to the chassis as one solid unit.

NYLOK Nuts stay tight in any position—seated or not. They're easy to apply manually or automatically. Can be used over and over.

Check your products for applications where NYLOK Nuts can do the job better, save you money. Then contact your Republic Distributor. Mail coupon for more data.

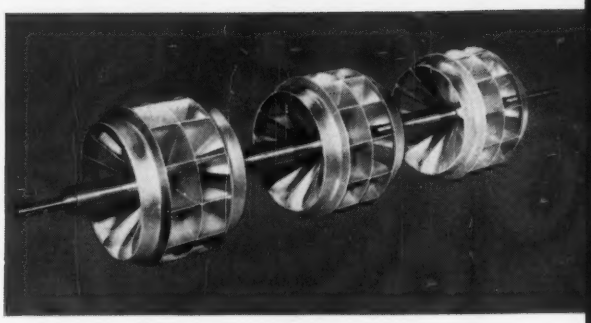


Dump body by Heil Company, Milwaukee, Wisconsin. Unit is anchored to the chassis by 16 Republic NYLOK Nuts.

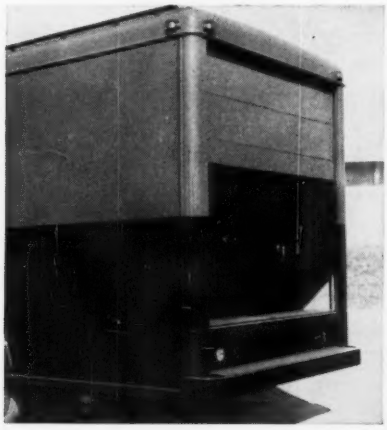


HERE'S HOW NYLOK WORKS

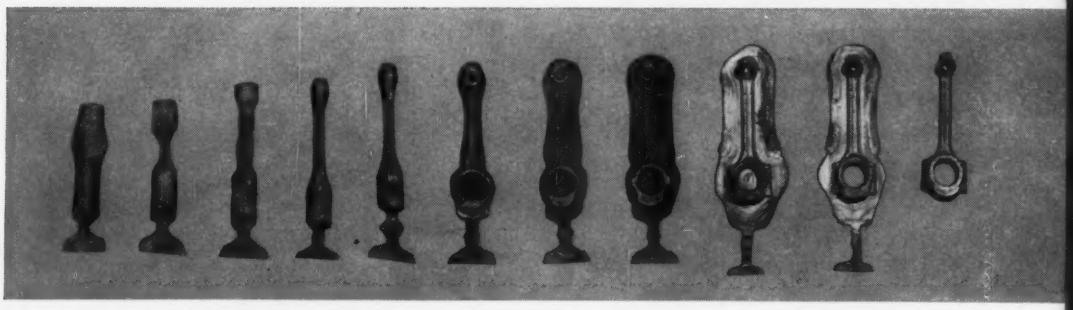
A nylon plug firmly staked into one of the faces of the cold forged hex nut forces a tight, metal to metal contact of opposite mating threads for vibration-proof lock.



ROTOR SHAFT MACHINING ELIMINATED. Buffalo Forge Company, Buffalo, N.Y., uses *Republic* ELECTRUNITE® *Mechanical Tubing* as rotor shafting in air-conditioning and ventilating unit blowers. ELECTRUNITE's uniform concentricity eliminates need for shaft machining—saves time and money. Shafts are bored at each end and plug inserted for the bearing. Send coupon for more facts on ELECTRUNITE Tubing, stainless, or carbon.



PAINT STAYS ON. Selection of steel for overhead doors on U.S. Post Office trucks involved two important factors: steel must meet rigid government paint adherence specifications, yet must be economically priced since the manufacturing contracts are on a competitive bid basis. Gerstenslager Co., Wooster, Ohio, chooses *Republic Electro Paintlok*® to meet these requirements. Send coupon for more Electro Paintlok information.



SPEED CONNECTING ROD PRODUCTION. Forging connecting rods from *Republic AISI 8637 Hot Rolled Alloy Steel*, Bingham-Herbrand Corporation, Fremont, Ohio, realizes substantial savings. Non-varying uniformity permits faster production with fewer rejects. Send for data on uses of high production Republic Alloy Steel for your products.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

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DEPT. ST-9557
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on:

☐ Hot Rolled Alloy Steel ☐ Electro Paintlok
☐ NYLOK Fasteners
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Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

WHEN YOU NEED TUBULAR RIVETS

Milford's five manufacturing plants are within overnight trucking distance of your assembly line

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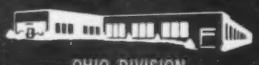
PENN DIVISION
Hatboro, Pennsylvania (Osborn 5-4560)



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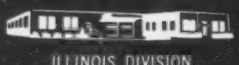
Elyria, Ohio (Fairfax 3-3177)



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Rivets can create "king-size" headaches when they aren't at your assembly line in the quantity you need—when you need them.

To give you unmatched delivery service on tubular rivets, Milford has five manufacturing plants and twenty sales offices strategically located across the country's industrial beltline. To cut delivery time and production costs, to improve product appearance, to assemble your product on automatic rivet-setting machines—get in touch with Milford.

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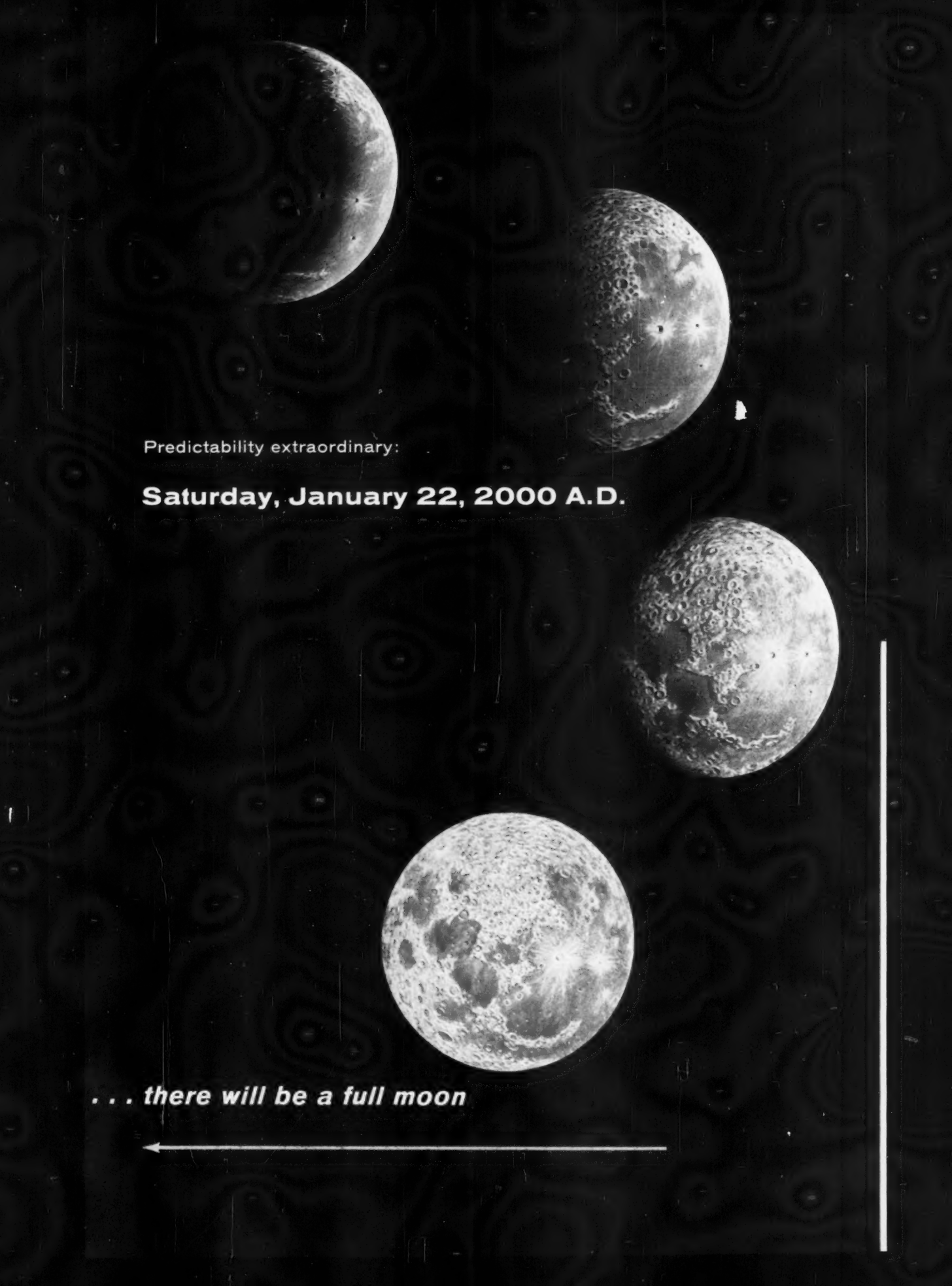

Predictability extraordinary:
Saturday, January 22, 2000 A.D.
. . . there will be a full moon

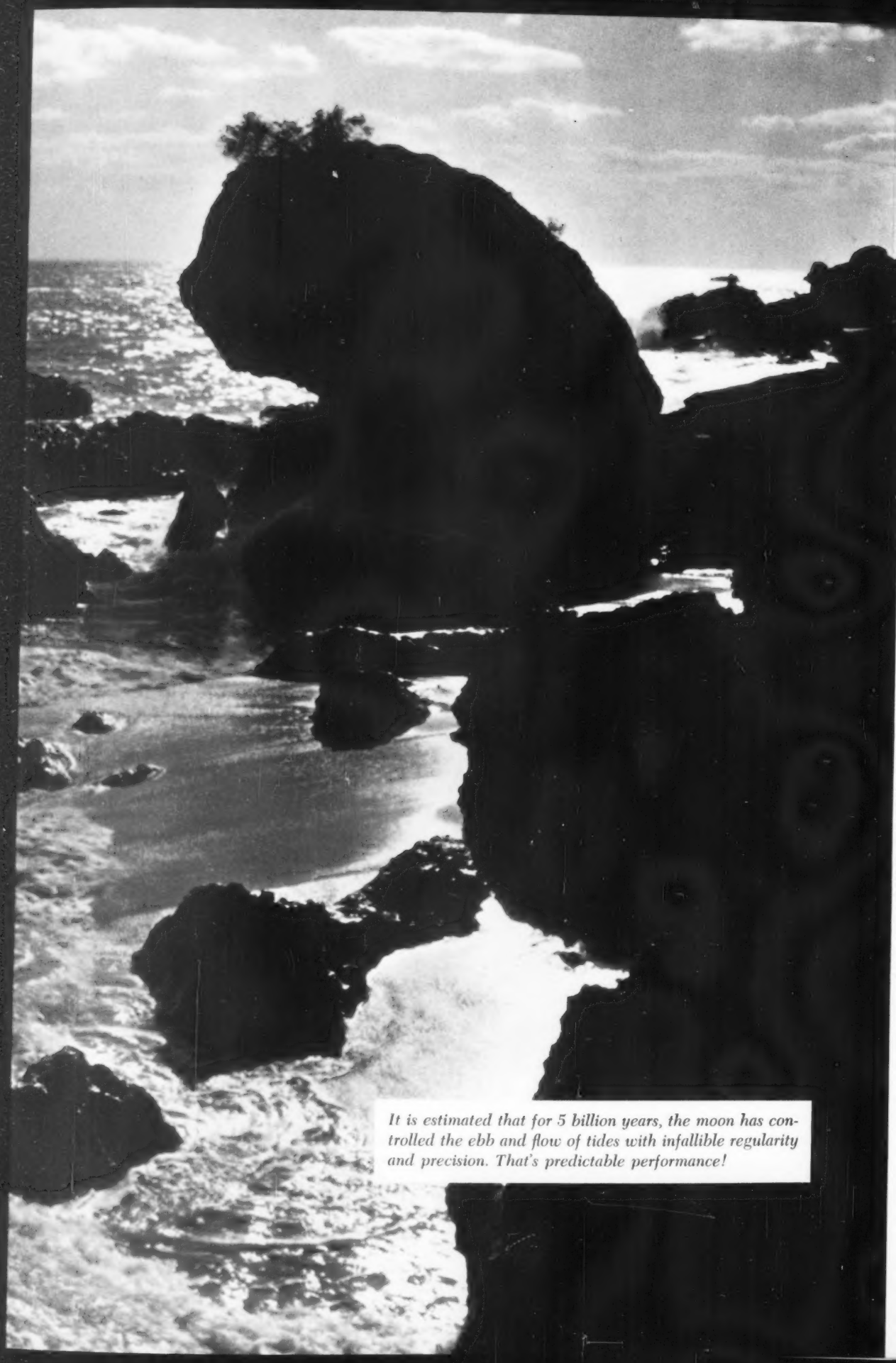
Don't you wish you could count on

such predictable performance from the

high temperature alloys

you use?

(especially when you're "shooting for the moon" in product reliability!)



It is estimated that for 5 billion years, the moon has controlled the ebb and flow of tides with infallible regularity and precision. That's predictable performance!

predictable as the moon . . . reliable as the tides

Carpenter high temperature alloys...

MEL-TROL® processed...

give you new standards of uniformity

in fabrication and performance

No compromise! In high temperature parts, it's all or nothing. The demands of production and service must both be met. When conventional alloys can't meet the requirements, the cause is often lack of uniformity in the steel itself. It can usually be traced to variations in toughness and composition between the outside and core areas of the ingot.

New, exclusive MEL-TROL process! In addition to other unique quality controls, it includes a patented mold which reduces segregation of harmful impurities during solidification of the ingot. This ingot is more uniform, freer from segregation. Result: *Carpenter* High Temperature Alloys give you clean, sound, tough metal from outside to core . . . in every bar. And only *Carpenter* can assure you of such predictable performance . . . through production and into service.

No premium price! *Carpenter* High Temperature Alloys made to MEL-TROL quality standards are offered at no extra cost. For additional information contact your nearby *Carpenter* SERVICE-CENTER. Other products available are: Matched Tool and Die Steels—Stainless Steels—Electronic, Magnetic and Electrical Alloys—Special-Purpose Steels—Tubing and Pipe—Fine Wire Specialties.

New concepts in service! Increased capacity... with the addition of new melting and finishing facilities. Better-than-ever quality . . . more research . . . more technical assistance . . . more local warehouses . . . *Carpenter* is growing bigger and better in all directions. Building upon a long history of pride in craftsmanship . . . backing up our faith in the future with dollars on the line . . . we are combining the best of modern technology and traditionalism. All these are reasons why *Carpenter* is known as . . . *a new company 70 years old.*

Carpenter steel

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local service from coast to coast!

stainless steels! tool and die steels! special-purpose alloy steels!

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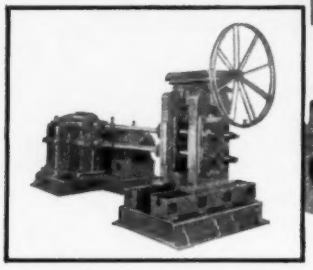
The Carpenter Steel Company, Reading, Pa.

Whatever your requirements . . . SECO's staff of trained engineers can help you solve any special Mill problem you may have . . . from creative designing through installation (including *all* required auxiliary equipment).

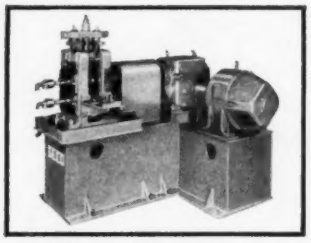
Should your problem involve a special Cluster Mill (to accommodate either ferrous or non-ferrous metals), or a Hot Rolling Mill that bonds non-ferrous metal to a steel base . . . SECO can supply.

Custom Built HOT ROLLING MILLS *by* SECO *assures* Predictable Performance

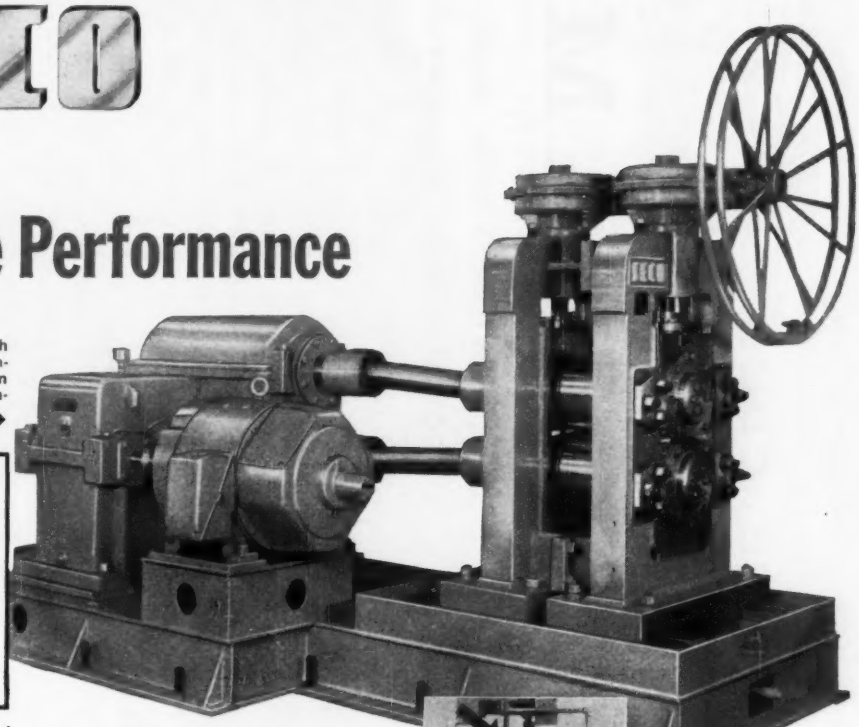
A special, custom-built 2-high Hot Roll Flattening Mill for non-ferrous metals. (Can be built in 2 or 4-high types or a combination of both.) ▶

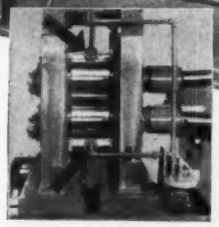


▲ A SECO designed and built Bi-Metal Bonding Mill on movable mountings.



▲ A 6-inch, 2-high Wire Flattening Mill for single or tandem use.





◀ Mill is equipped with two gas jets as a means for pre-heating rolls (see arrows).

Special Features: ▲

- Water-cooled chocks for lubrication
- 900° F. rolling temperature
- Hand wheel screw-down (adaptable for power)
- Special alloy steel rolls
- Timken Tapered Roller Bearings
- Can be built for 8, 10, 12 or 16-inch widths.

SECO

STEEL EQUIPMENT COMPANY

P. O. BOX 737, WARRENSVILLE STATION

CLEVELAND 22, OHIO

SECO STEEL MILL EQUIPMENT

- Leveling and Shearing Lines
- Combination Edging and Flattening Lines
- Tension Reels for Strip Polishers
- Narrow Strip Grinding Machines
- Slitting Lines
- Multiple Strand Pull-out Rolls and Take-up Frames
- Strip Coilers (Up and Down Type)
- Traverse Reels for Narrow Strip
- Steel Coil Up-enders
- Scrap Ballers

Affiliated with Lee Wilson Engineering Co., Inc.

Milwaukee-Matic

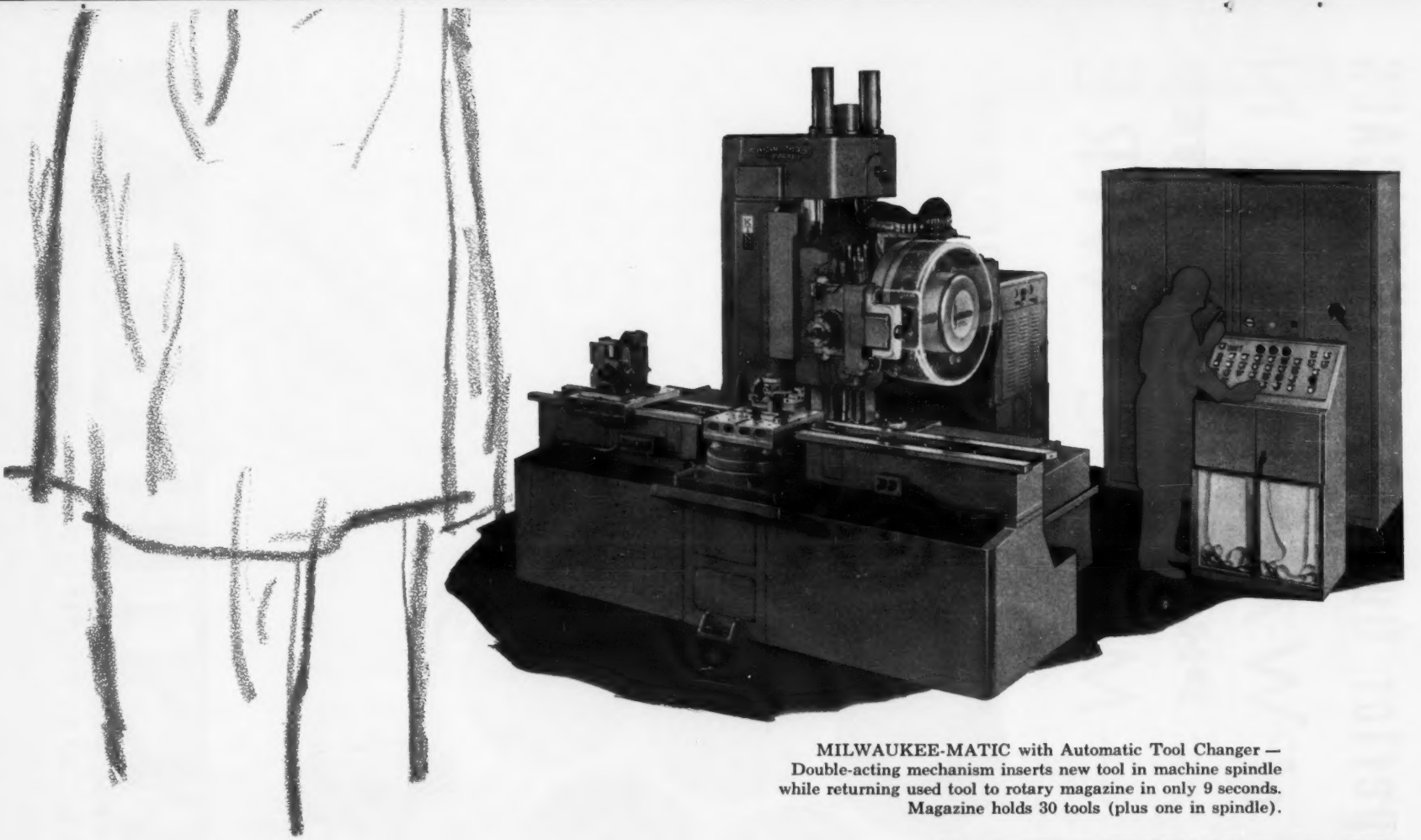
"Just A Minute

. . . while I mill, drill, ream, tap, bore, counterbore, countersink and spotface a part automatically."

"Sure, the job could be done on a variety of separate machines and fixtures — plus a lot of expensive setup and transfer time . . . but why make a project of it? With the Kearney & Trecker MILWAUKEE-MATIC, you do the whole job automatically, on a single integrated machine . . . under numerical control, of course. With punched tape control, each workpiece is precision-finished exactly like the one before it . . . accurate to tenths."

If your schedules call for small- and medium-lot runs of parts requiring a variety of machining operations, you'll want to know more about the profit-producing MILWAUKEE-MATIC . . . a new manufacturing concept. Investigate, and you, too, will be saying, "Just a MILWAUKEE-MATIC minute . . . while I mill, drill, ream, tap, bore . . . "

Write for complete literature file or call your local Kearney & Trecker representative today.



MILWAUKEE-MATIC with Automatic Tool Changer — Double-acting mechanism inserts new tool in machine spindle while returning used tool to rotary magazine in only 9 seconds. Magazine holds 30 tools (plus one in spindle).

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These P/M Lines Help Western Electric Get Top Quality

At Western Electric every possible means to achieve quality is employed, because quality is the keystone of the necessary reliability of Western Electric telephonic apparatus. Western Electric's Hawthorne Works, through engineering consultants, United Engineers and Constructors, selected P/M strip handling equipment for 4 major strip handling lines, including the pickling line shown, and lines for annealing, coil-build-up (welding), and tin-coating. P/M engineers *productioneered* this equipment to produce highest quality brass, nickel silver, and phosphor bronze. P/M *productioneering* literally tailors P/M-built lines to user's needs. Whatever your need—for maximum quality, or maximum output, or lower costs—P/M *productioneered* equipment can help you get it. Let us furnish more information.

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Designers and Builders of Lines and Equipment for processing Steel and Non-Ferrous Metals including: lines for pickling, slitting, shearing and cutting-to-length, grinding, scouring, coil build-up, inspection, and other sheet and strip processing lines and machinery.

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improved grinding action and longer wheel life

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Better than ever for long wheel life . . . faster by far for economical weld grinding. This efficiency is yours with Simonds Series 60 Double XX Wheels. New manufacturing methods give this new series of reinforced resinoid bonded wheels superior grinding action. Each wheel has maximum amount of abrasive grain. Doubly reinforced for extra strength and safety. Lightweight rigid type for general use. Unexcelled for grinding welds. You can also get slightly flexible Fibrex Wheels for lighter jobs and stainless steel. Order from your Simonds distributor.

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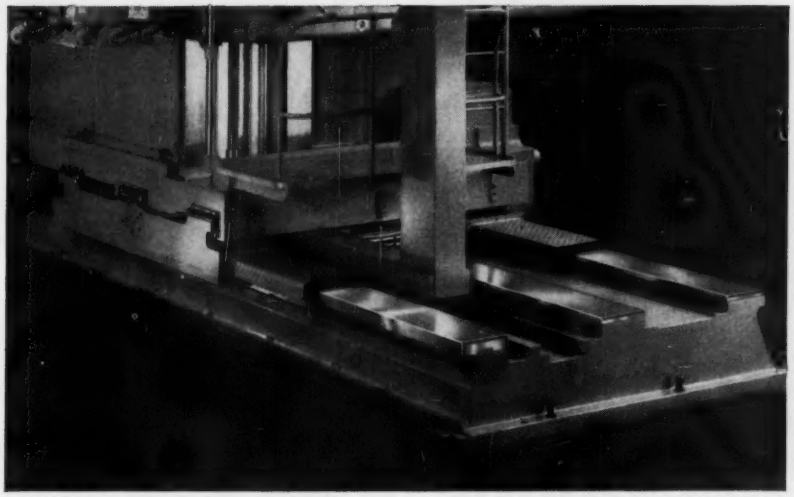
O-KNI-CO

MACHINE TOOL news

PRODUCTION FACTS THAT INCREASE YOUR PROFITS

PUBLISHED BY THE OHIO KNIFE CO., CINCINNATI, OHIO



O-KNI-CO hardened bedways, cross ways on new GRAY 650 FC horizontal boring machine.

Big machine tool builders solve wear and accuracy problems with quality O-KNI-CO processed hardened ways and wear plates

The G. A. Gray Co., The Niles Tool Works of the Baldwin-Lima-Hamilton Corp., The Gisholt Machine Co. are among the many users of O-KNI-CO products.

By a time proven process, special analysis tool steel of any thickness is eternally bonded to a soft, tough, easily machinable steel, producing a superior way that will not warp or bow. Special O-KNI-CO hardening process (65-66 Rockwell C) to the full depth of the tool steel, along entire length of the way, develops amazing wear-resistant qualities.

Ordinary ways of one type steel, are usually heat treated by flame hardening, carburizing, or some similar process. This results in variations of depth and quality of hardness along the length of the way. The degree of hardness is usually well below the minimum standard (63 Rockwell C), necessary to eliminate galling, scoring and excessive wear. These conditions destroy the accuracy of the machine almost from the first day of operation, requiring continuous compensations in positioning of work.

O-KNI-CO processed hardened ways on 60 inch lathe made by The Niles Tool Works.

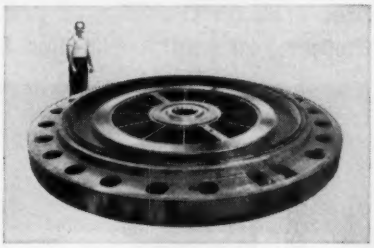
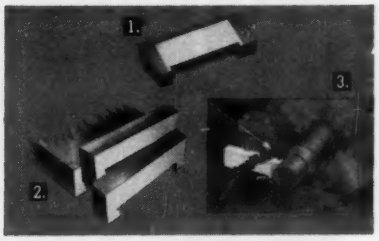


Table of Niles 20 foot vertical boring mill, inverted to show O-KNI-CO wear plates.

O-KNI-CO processed hardened ways are carried in stock in a variety of sizes and shapes, or made to suit your specific requirements. They are a perfect mating surface for either metal or non-metallic bearing surfaces. O-KNI-CO processed clad aluminum bronze wear plates are made by the same process and are available in standard stock sizes for quick delivery.

Gisholt Machine Co. gives amazing demonstration to prospective lathe buyers

Prospective lathe buyers witnessed an amazing demonstration of OK Bedway hardness at The Gisholt Machine Co., Madison, Wisconsin. Gisholt uses OK Ways exclusively on their ram and saddle



turret lathes, and to prove their quality they (1) took a section from an OK Bedway, (2) made it into a tool bit, (3) locked it in a fixture and cut spiral shavings from 1045 cold-rolled steel.

Ohio Knife Co., big supplier of shear blades to equipment builders

Special O-KNI-CO heat treating techniques applied to shear blades give maximum toughness and superb edge holding qualities. Various grades are available for shearing. OK Battle Axe blades shear up to ¼" mild steel, OK Dura-chrome blades for shearing hot or cold plate up to 1¼" and OK Utility blades for short runs and heavy plate.

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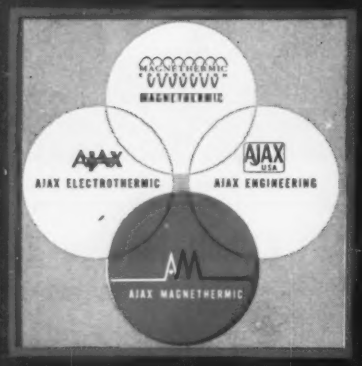
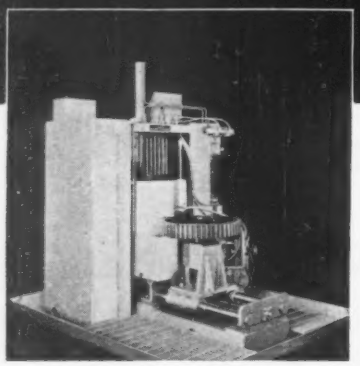


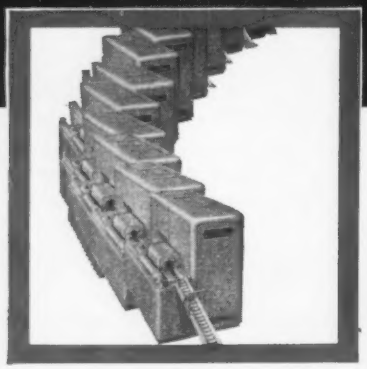
we like to be close to our customers...

and future customers!

Ajax Magnethermic Representatives are located in major market areas. You will find the telephone number of the office in your area on the opposite page. Whether you want information on an application, or service on an existing installation, the Ajax Magnethermic man can give you assistance. He knows induction heating and melting.



HEAT TREATING... AM makes Induction heat treating equipment for either high production or job shop operation. Shown above—the versatile gear hardener... heat treats 6" to 60" diameter gears.



BILLET HEATING... Press the button, that's all! The AM Billet Heater delivers a billet at exact temperature to the extrusion or forging press.

MELTING... AM supplies all types of Induction Melting Furnaces including: core, coreless, lift and automatic pouring, vacuum and degassing.

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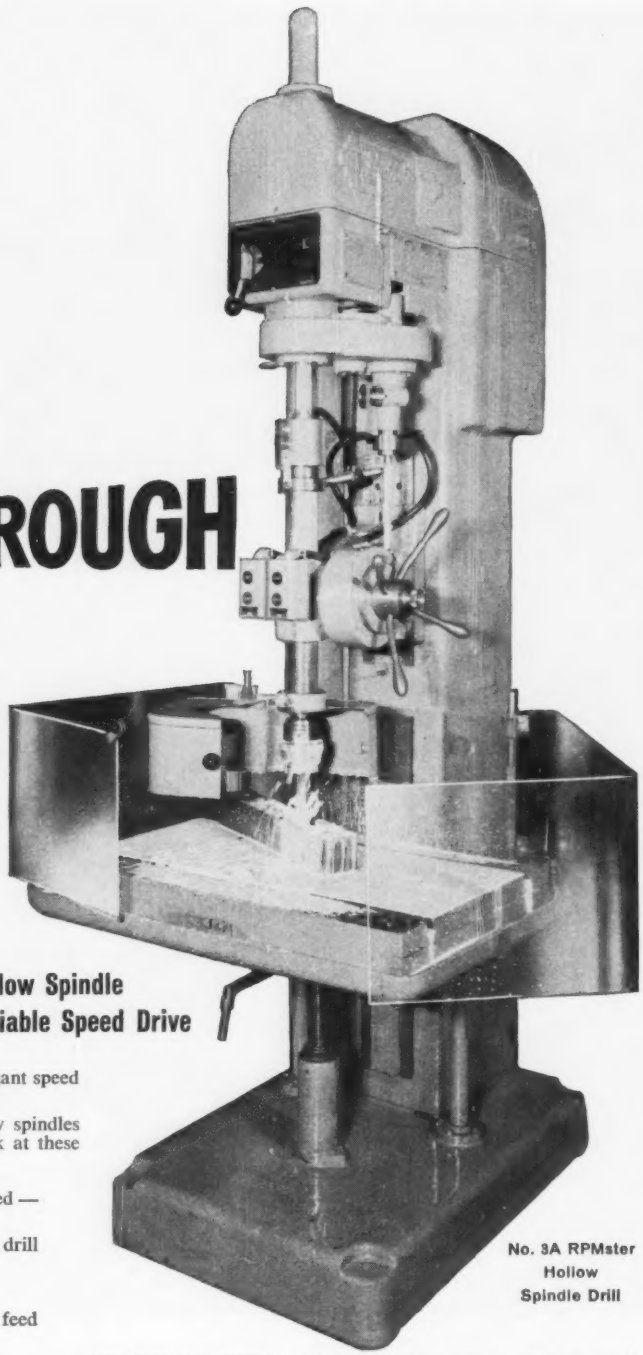
Buffalo RPMster with • Hollow Spindle • Variable Speed Drive



No. 3A RPMster Hollow Spindle Drill

Buffalo pioneered the RPMster's variable speed drive — instant speed changes while drilling.

Now, *Buffalo* brings you the RPMster with special hollow spindles to shatter concepts of formerly "impossible" drilling. Look at these test results:

316 STAINLESS STEEL — ¾″ drill, 700 rpm, .001″ feed — 4″ deep; ½″ drill, 900 rpm, .001″ feed — 4½″ deep.

TOOL STEEL SHEAR BLADES Hardened to 54 R c. ½″ drill — 800 rpm .001″ feed — 2½″ through.

RENE 41 — ½″ hole @ 750 rpm .001″ — 3″ through.

BERYLLIUM BRONZE — ½″ hole @ 6200 rpm hand feed through 2½″ in 1½ seconds.

TITANIUM — ⅜″ hole @ 1000 rpm .002″ feed.

CAST IRON — ¾″ hole @ 2000 rpm. 004″ feed.

52-100 ALLOY STEEL — 7/16″ hole @ 800 rpm .001″ feed.

SEE FOR YOURSELF. At no obligation, send a sample of any hard-to-drill material to the factory. We will test-drill it and return the sample with a report on the drilling tests. Send your sample today, and write for details!

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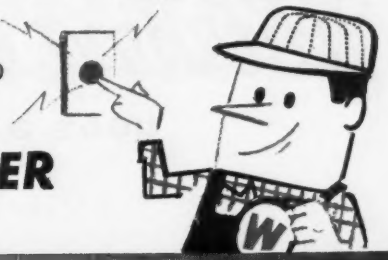

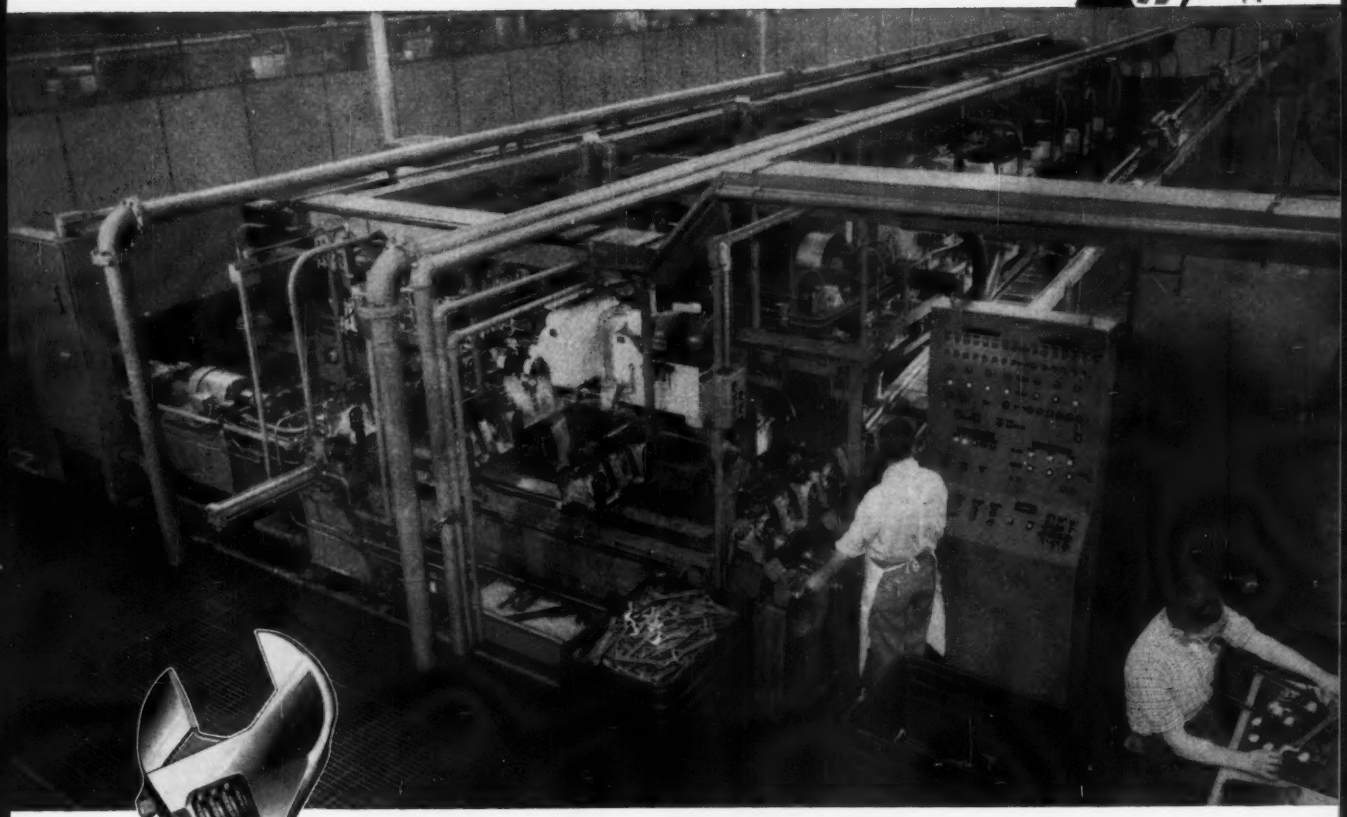

• AUTOMATED MACHINING guarantees smooth adjustment, exact fit in every wrench. This million dollar transfer machine was designed especially for Williams' Superjustable® wrench production. A push of a button puts 28 stations in operation... consistently machining to uniformly close tolerances. Fully machined wrench heads are constantly checked on special gauges to further insure perfect fit with sliding jaws, worms, pins and springs. No other manufacturer has this automated equipment to so precisely machine wrenches that *work better... last longer.*

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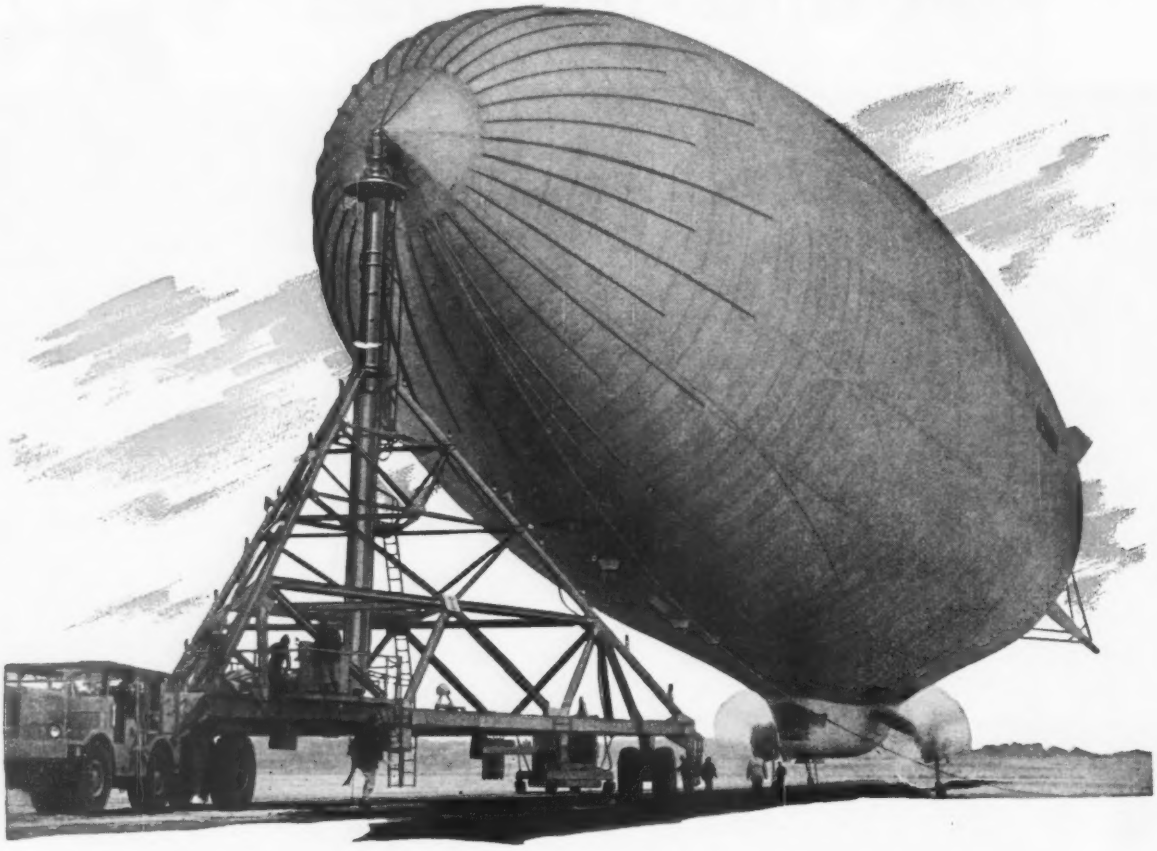
"Hitching Post" for Navy Blimp!

uses a 19-foot Saginaw b/b Screw!

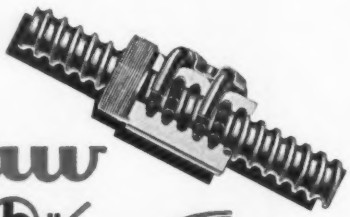


A Saginaw Ball Bearing Screw is located in the vertical column of these telescoping Goodyear Blimp Mooring Masts! The screw's extremely low friction and rapid positioning ability synchronizes the mooring fixture with the nose of the blimp to quickly and safely secure the Navy craft.

The huge high-efficiency Saginaw b/b Screw used here is over 19 feet long and with a B.C.D. of 6 inches. From the tiniest Saginaw Screw used in instrumentation, to this giant used in the Goodyear Mooring Mast, the principle of the Saginaw Ball Bearing Screw is almost universally adaptable. Its ability to replace acme screws and hydraulic devices *with over 90% efficiency* has already assured smoother, more dependable actuation for over 5,000 satisfied customers!

The Saginaw Screw may be able to improve *your* product's performance, give you greater power and maintenance savings, and lower your initial cost. Talk your actuation problem over with Saginaw's engineers. Just write or phone Saginaw Steering Gear Division, General Motors Corporation, Saginaw, Michigan—*world's largest producers of b/b screws and splines.*

Actuation To Fit Your Individual Requirements
Have been built as small as 3/16 in. B.C.D. and 3/4 in. long, as large as 6 in. B.C.D. and 40 ft. long. Larger sizes can be built to your order.

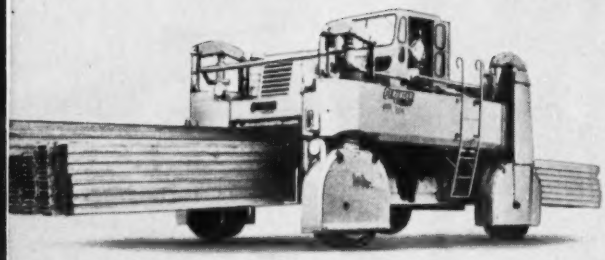


Saginaw ball bearing Screw

WORLD'S MOST EFFICIENT ACTUATION DEVICE

TOWMOTOR-GERLINGER

offers you three complete capital-saving services!



1 YOU LEASE *without down payment!*

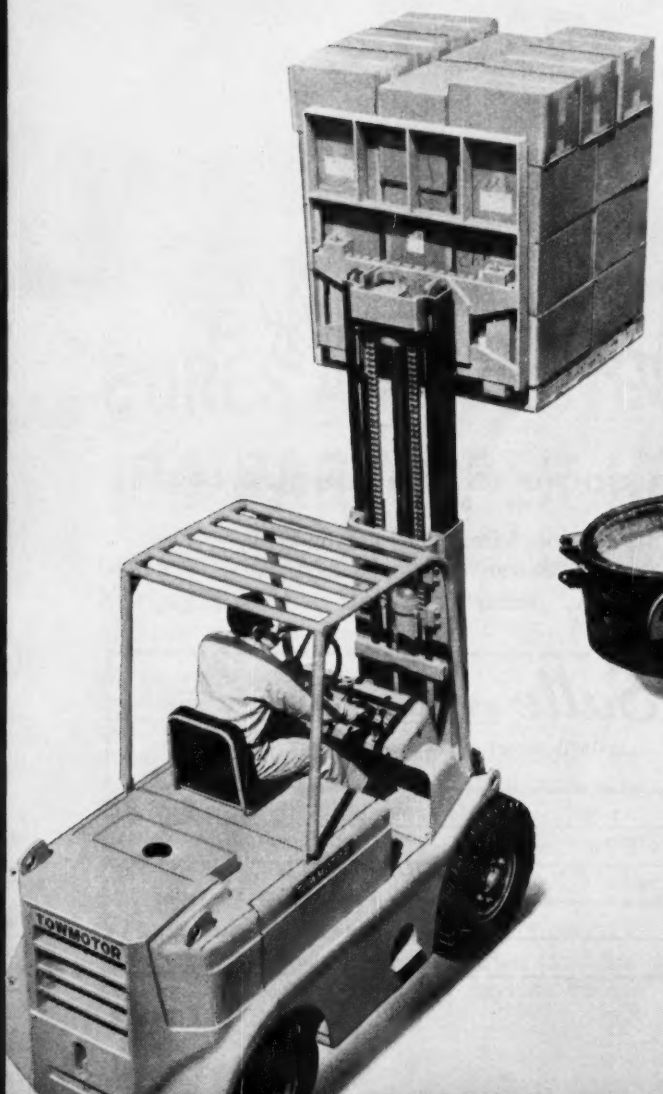
You don't make a *down payment* when you use the Towmotor-Gerlinger Lease-A-Truck Plan. You put T-G equipment to work on a continuous, year-'round basis. You just make a small monthly payment—paid out of savings the equipment produces.

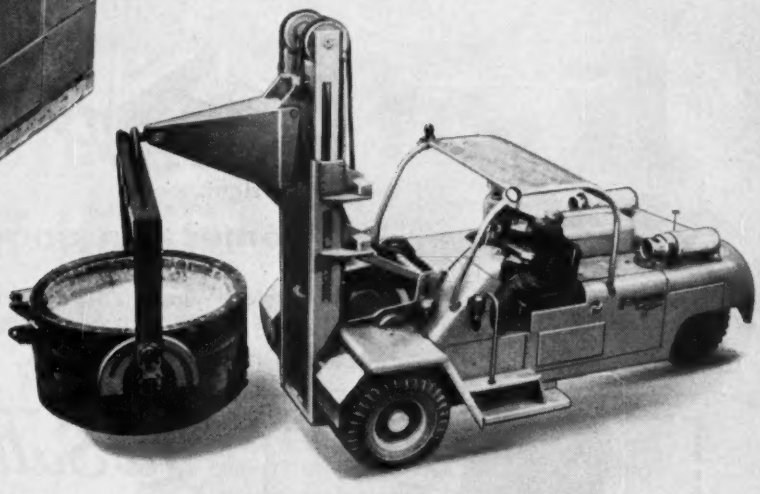
2 YOU RENT *without cash outlay!*

You don't tie up working capital when you *rent* Towmotor-Gerlinger fork lift trucks and material carriers. You put them to work immediately. You start cutting handling costs immediately. Your only cash outlay is one small monthly charge.

3 YOU BUY *and save as you pay!*

You don't pay cash for Towmotor-Gerlinger equipment when you use our low-cost Time Payment Plan. You make reasonable monthly payments. Low interest rates make it easy. Handling economies consistently pay the monthly cost many times over.





Complete factory-supervised maintenance can be included in *any* of the above plans! For complete information, write Towmotor-Gerlinger Rental Division, Towmotor Corporation, Cleveland 10, Ohio.

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Ask for 24-page booklet, "How to make your own machine and repair parts quicker and easier".. and a list of Steel Service Centers.

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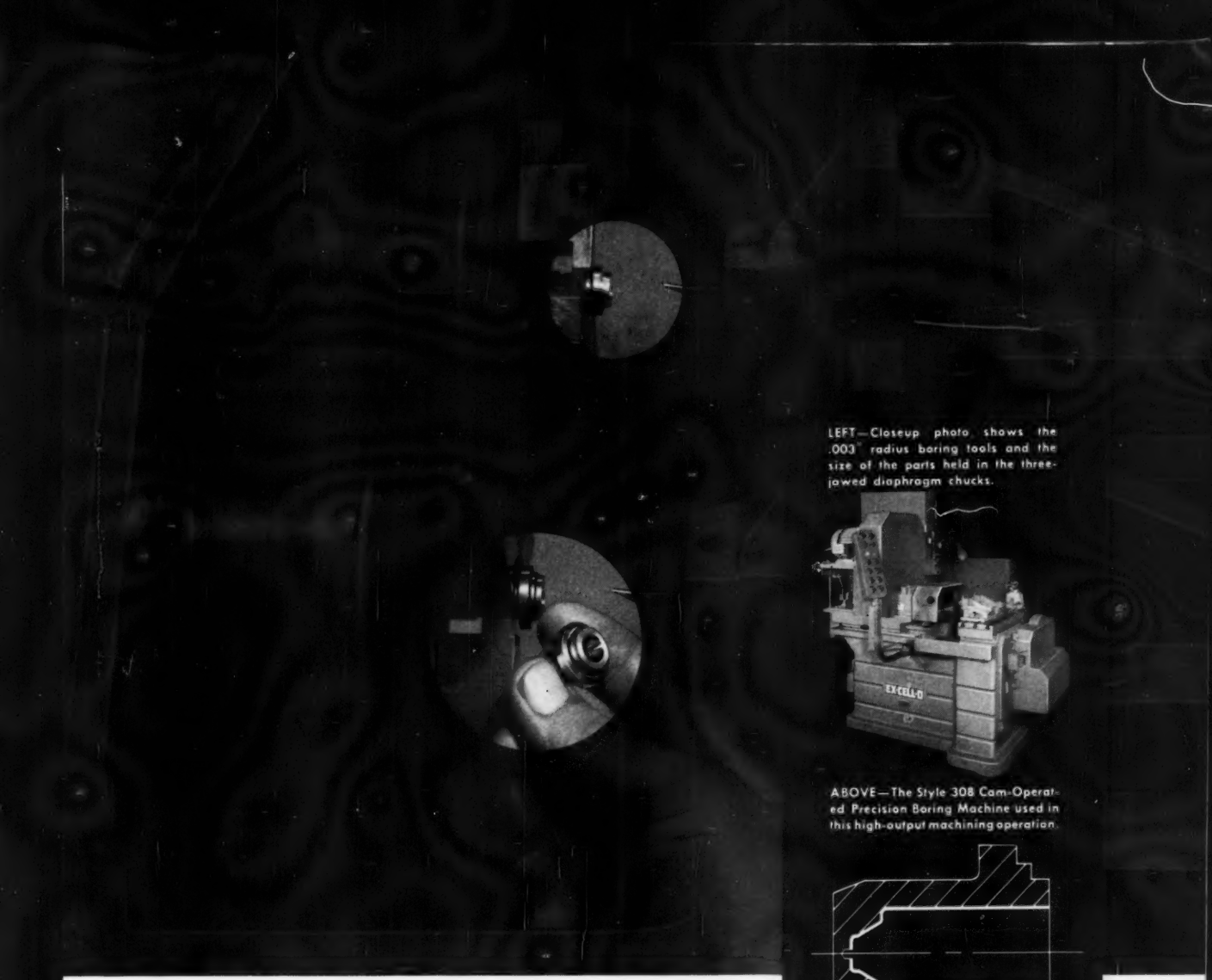
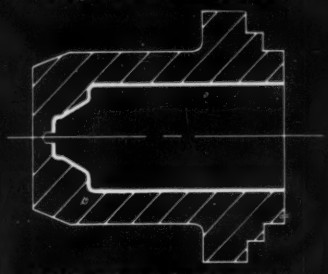


LEFT—Closeup photo shows the .003" radius boring tools and the size of the parts held in the three-jawed diaphragm chucks.

ABOVE—The Style 308 Cam-Operated Precision Boring Machine used in this high-output machining operation.



ABOVE—Cutaway, twice actual size of the part, shows contour of the finished cut. Surface finish is held to 12 RMS.

59-20

BORES AND CONTOURS 184 PARTS PER HOUR

Style 308 Cam-Operated Precision Boring Machine finishes small stainless steel parts to 12 RMS

Speed and precision in continuous, close-tolerance production of contoured parts come easy to this Ex-Cell-O Cam-Operated Precision Boring Machine. Direct cam action makes it possible. Two cams are mounted on a single shaft; one acts directly on the cross slide follower, the other on the table follower. There are no levers. Changing the cams changes the form for the next job—in minutes.

Style 308 (illustrated) and the larger Style 312 hold the parts in one or more spindles, tools are mounted on the cross slide. The machine above uses such a setup to straight-bore and generate the inside contour of 184 parts per hour, two at a time.

If you are anxious to get a similar production process underway quickly and economically, start now by calling your local Ex-Cell-O Representative. Or, if you prefer, write direct.

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EX-CELL-O PRECISION PRODUCTS INCLUDE: MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • TORQUE ACTUATORS • THREAD AND GROOVE GAGES • GRANITE SURFACE PLATES • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT.

GENERAL CHEMICAL'S NEWEST SULFURIC BARGE

Ready to deliver! The "Genco 9"—General Chemical's newest sulfuric acid barge—goes down the ways.

With the launching of the "Genco 9," General Chemical put its twelfth sulfuric acid barge into service . . . newest addition to the nation's largest fleet operating on coastal and inland waterways.

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Extensive production facilities. General Chemical now has 21 sulfuric plants,* 15 of which are equipped to handle spent acid. Each is geared to meet regional requirements. In addition, the output of one backs up another—helping assure continuous supply of sulfuric to meet emergencies or unexpected demands.

For specific information on how General can serve your sulfuric acid requirements, write or phone your nearest General Chemical sales office.

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YOUNGSTOWN STEEL is quality tin plate. For right through final close visual inspection, Youngstown controls not only basic steel quality, but tin plate quality itself. You can get the temper and gauge you want from two modern full range Youngstown tin mills at strategic Indiana Harbor. Here, Youngstown's new continuous annealing facilities and new coil finishing capacity help deliver cost-cutting answers to your tin "pack" needs. For quality tin plate, count on Youngstown, a growing force in steel.

Youngstown – growing force in steel

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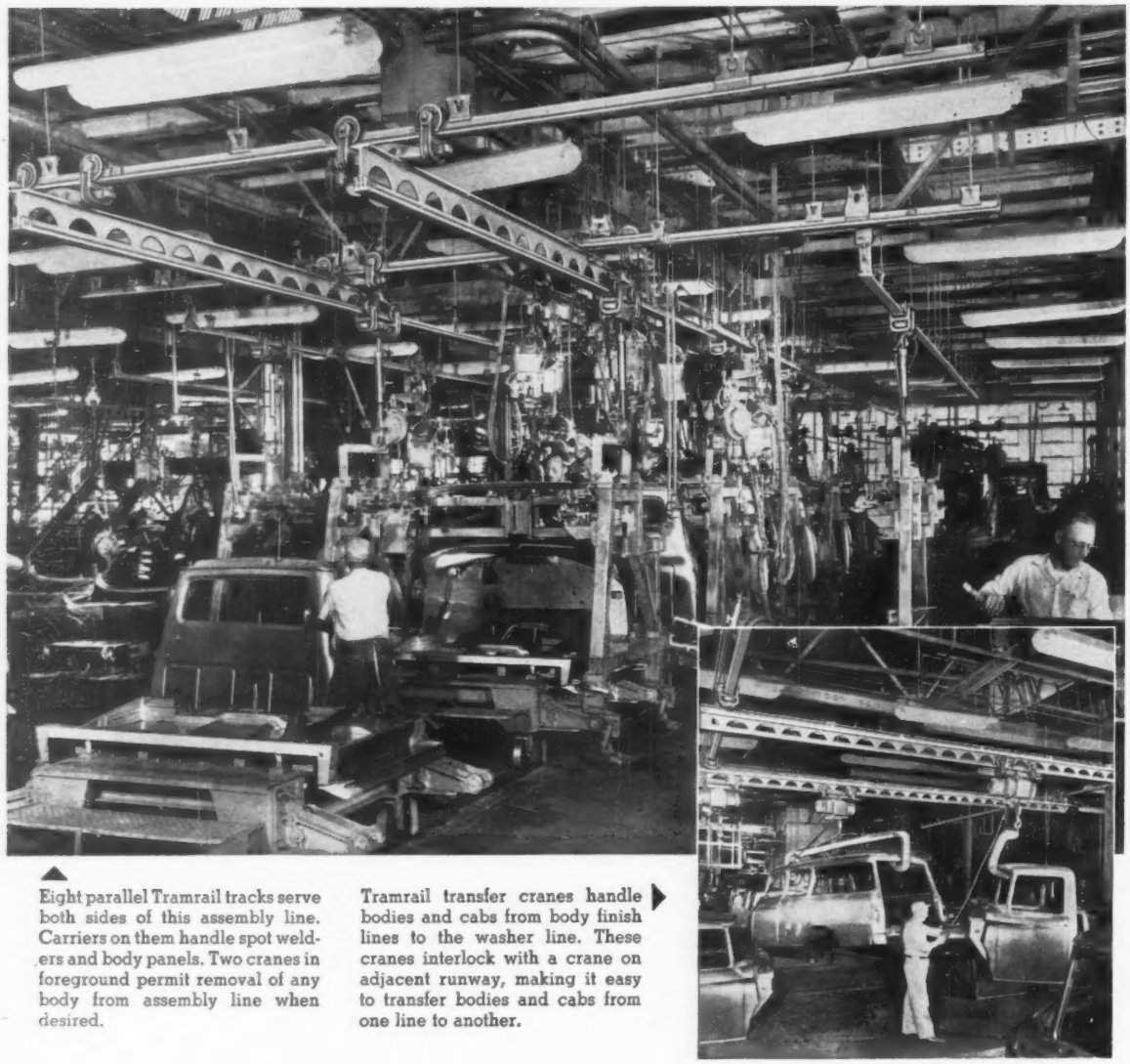
CLEVELAND TRAMRAIL *DEPENDABILITY* FULLY PROVEN BY TRUCK MANUFACTURER

In Continuous Service for Nearly Quarter Century



Eight parallel Tramrail tracks serve both sides of this assembly line. Carriers on them handle spot welders and body panels. Two cranes in foreground permit removal of any body from assembly line when desired.

Tramrail transfer cranes handle bodies and cabs from body finish lines to the washer line. These cranes interlock with a crane on adjacent runway, making it easy to transfer bodies and cabs from one line to another.

IN a truck manufacturing plant every minute counts. Slow-downs or stoppages in any department cannot be tolerated because the operation of each directly affects the others. Here is where the quality of equipment really shows up.

Cleveland Tramrail has been in use for almost a quarter century throughout the large plant of a prominent truck manufacturer for a wide range of materials handling work. It has kept apace with production requirements.

The superior design and exacting standards to which Cleveland Tramrail is built, assures outstanding performance in the manufacture of trucks or other equipment. Cleveland Tramrail equipment can be depended upon.

WRITE FOR FREE COPY of Engineering and Data Booklet No. 2008. Packed with valuable information. Profusely illustrated.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

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Automakers are riding high with aluminum grilles and trim—and from Olin Aluminum come finishes ranging from satin sheen to sunburst brilliance.

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Whatever you make, you get primary aluminum and mill products in the alloys and finishes you need, along with the most attentive service in the business, when you work with your local Olin Aluminum representative or distributor. Check the Yellow Pages. Offices in principal cities.

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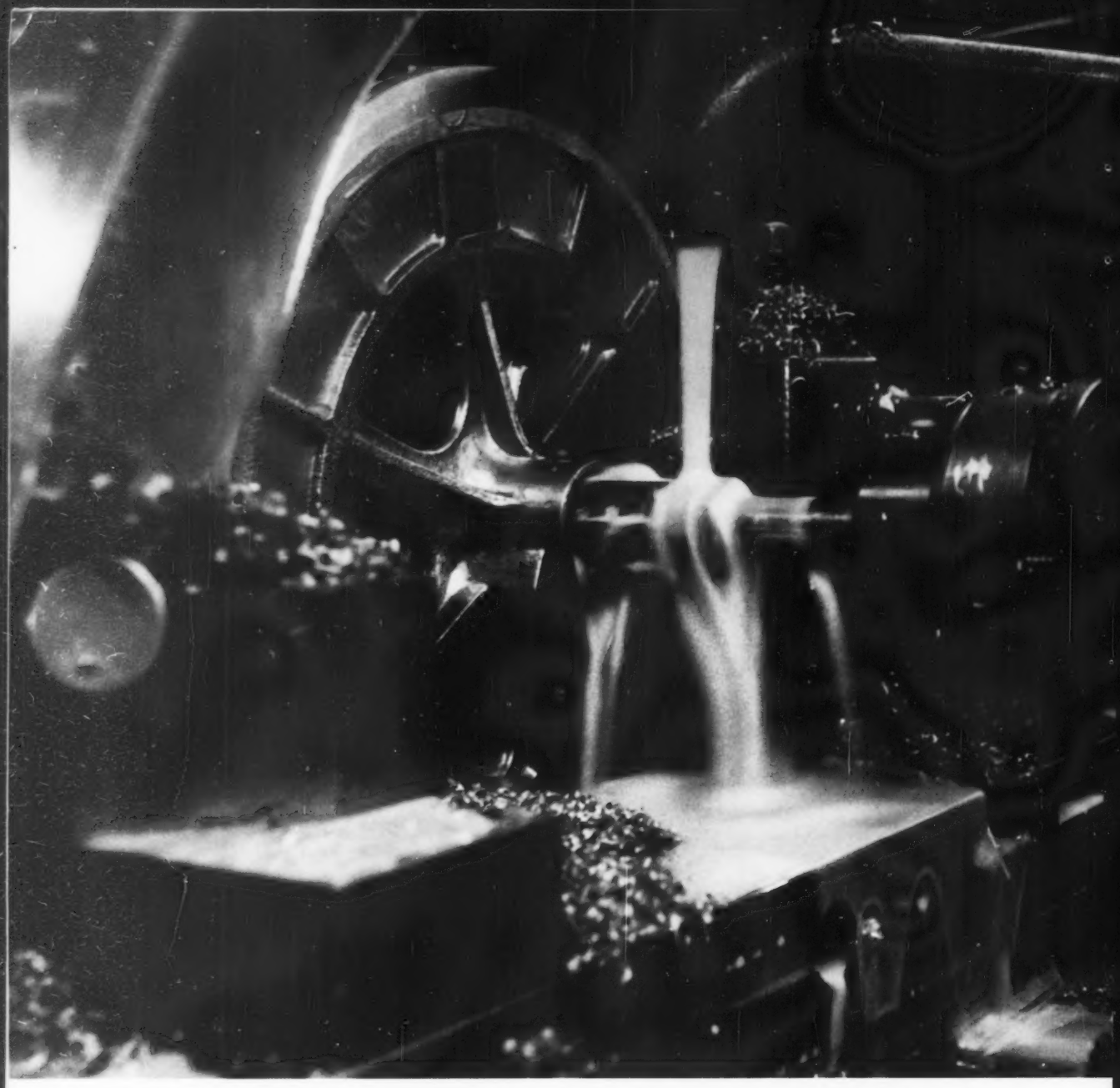


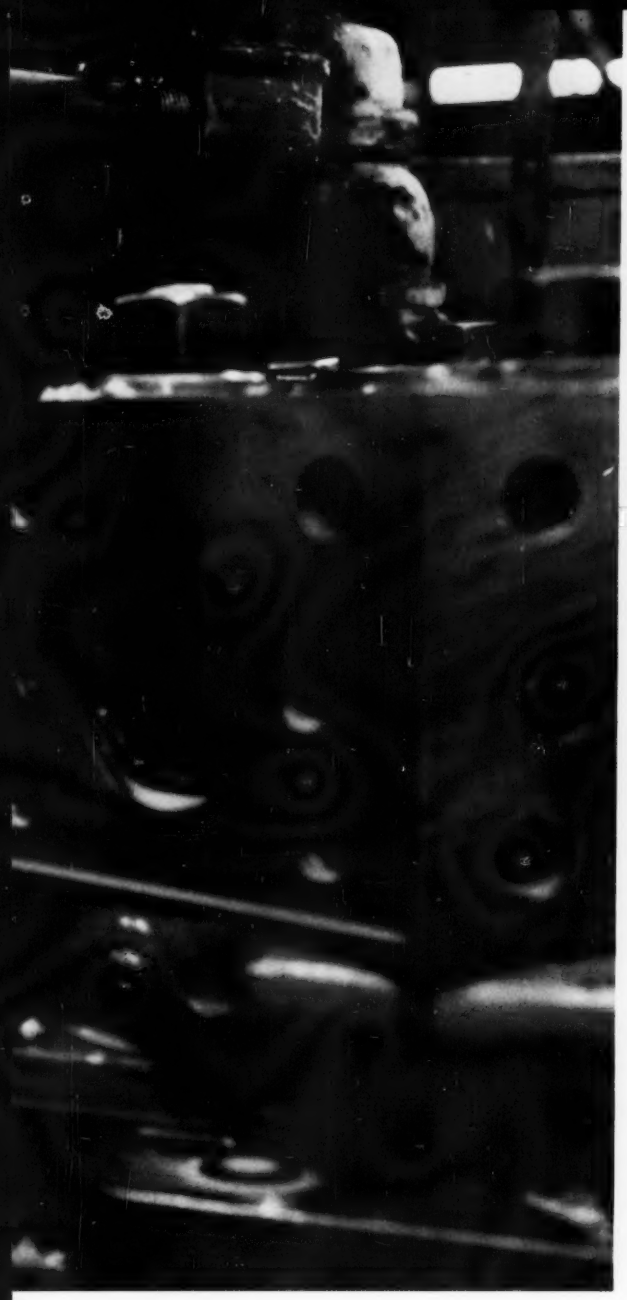
Extends tool life, maintains precision with Gulfcut® oils...

GULF MAKES THINGS

At its factory in Grand Rapids, Michigan, Automatic Music, Inc., operates over 400 machine tools to turn out the hundreds of small precision parts that are required for their famous coin-operated record players. More than 30 types of alloys, brasses, carbon steels and other metals are machined, many to tolerances of .0001".

One critical "juke box" component is the aluminum selector wheel, made to hold 200 pins, or one for each musical selection offered. Wheels are chamfered, bored, reamed, grooved, turned and burred in two minutes. At 208 rpm, using carbide-tipped tools, considerable heat would be generated, so Automatic Music uses Gulfcut Soluble Oil in a 1:50 emulsion. The machine operator reports long tool life, and what's more—"It's easy on the hands."

Another part requiring particular precision is the coin-control pin that rejects slugs while accepting nickels, dimes and quarters. Seven operations are involved in machining these pins on two turret lathes. For this, Automatic Music uses Gulfcut 41C, a sulfo-chlorinated-lard cutting oil that gives good finish, accurate tolerances and long tool life. On the average, the high speed tool needs



Gulfcut 41C helps insure fine surface finishes and contributes to accuracy. Machinist Harry Ames grinds the high-speed tool once per shift on the average.

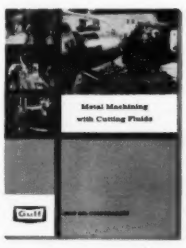
Automatic Music's Machine Repair Supervisor, Dan Van Heteren (right), shows small precision component to Richard Shumacker, Gulf Sales Engineer.

Aluminum selector wheel for Automatic Music "juke box" is completely chamfered, bored, reamed, grooved, turned and burred in two minutes. Gulfcut Soluble Oil in a 1:50 emulsion carries heat away from the carbide-tipped tool edge.

RUN BETTER!

to be ground only once a shift. Altogether, the firm uses Gulfcut 41C in fourteen turret lathes, all screw machines and more than a hundred drill presses.

Perhaps *your* machining operations can be improved by the use of Gulfcut oils. To find out, just call your Gulf office. Meanwhile, write for your free copy of the new 116-page handbook "Metal Machining with Cutting Fluids."



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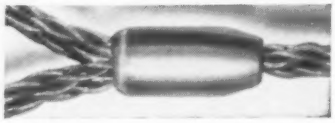

Tuffy's pressed-on metal ferrule is applied under hydraulic pressure so great that the eye splice has the full strength of the machine-braided fabric. Another Tuffy extra at no extra cost.

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Tuffy® Tips
—on safe use of Slings and Hoist Lines

Safety Council Cites Factors in Lifting Injuries

The National Safety Council reports nearly a fourth of all compensation cases are the result of unsafe handling methods or conditions. The following are listed as factors contributing to handling injuries:

"(a) Handling loads that are too heavy; (b) lifting or lowering with the back muscles instead of the leg muscles; (c) handling load with an insecure grip and failing to watch where hands are placed; (d) handling without sufficient help or failing to use mechanical equipment; (e) handling before getting a firm footing; (f) lifting or lowering with a jerking, twisting movement of the body, or when the body is in an awkward position."

Maintenance Tips for Hoisting Equipment

(1) Be sure crane and hoist controls are in proper working order. Don't use equipment that hasn't been tested recently.

(2) Inspect hitching equipment before it is used. Re-check after use.

(3) Remove hitching equipment not in use from hooks, hoists and loads. Don't allow it to remain loose.

(4) Store slings systematically when they're not in use. Don't let them lie around helter-skelter. They may be damaged between lifts.

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New Tuffy Sling Handbook

All about slings from A to Z, including types, dimensions and rated loads. Address **Union Wire Rope Corporation, 2160 Manchester Ave., Kansas City 26, Missouri.** Specialists in high carbon wire, wire rope, braided wire fabric, and stress relieved wire and strand.

3

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COMBINATION STARTERS IN SPIN-TYPE ENCLOSURES

Here's Allen-Bradley's Bulletin 713 combination starter with circuit breaker—featuring conveniently removable spin-type cover and base—for use in hazardous gas and dust locations. Inside you'll find the time-tested A-B Bulletin 709 solenoid starter.

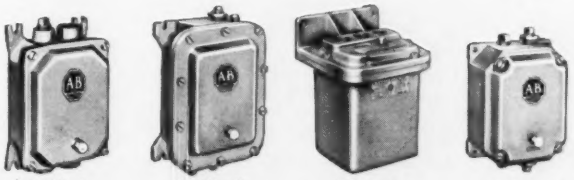
The consistent reliability of Allen-Bradley solenoid starters is a result of their design simplicity. With only ONE moving part, there's virtually nothing to go wrong—this is your assurance of millions of trouble free operations. In addition, the double break, silver alloy contacts are *always* in perfect operating condition—and remain so with *no* service attention. Also, all A-B starters have two permanently accurate thermal relays that protect motors against dangerous overloads. The reliability of these relays is not affected by atmospheric conditions.

To insure maximum production with minimum maintenance, always insist on Allen-Bradley *quality* motor control. Please write for full information.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

Cutaway of Enclosure
Shows Allen-Bradley combination starter. Screw-type cover and base permit quick access to the starter or the circuit breaker.

A-B Bulletin 713
Combination Starter



NEMA 4 Watertight Weatherproof
NEMA 7 Hazardous Gas Locations
NEMA 8 Corrosive Hazardous Gas
NEMA 9 Hazardous Dust Locations

These enclosures remain available. Because of the trouble free operation of Allen-Bradley control, bolted covers are not a problem.

9-60-RM

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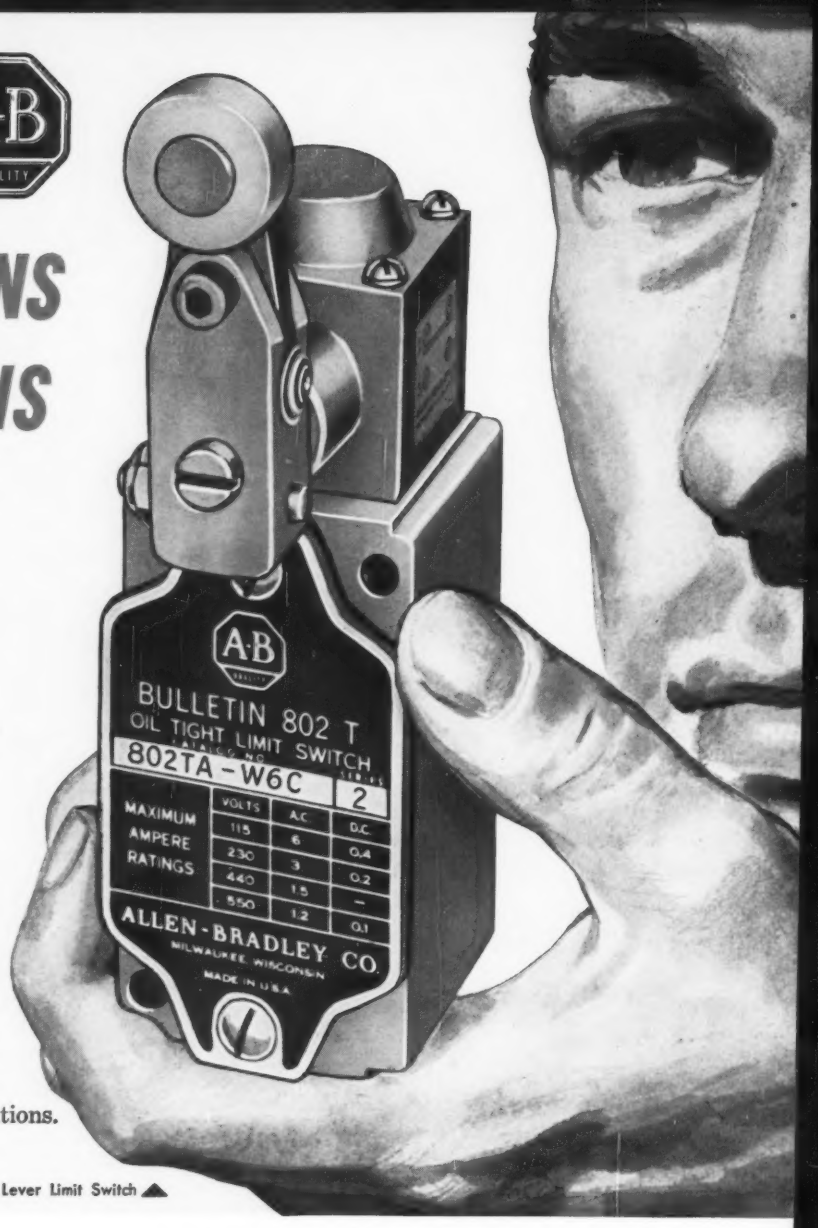
Quality Motor Control

MORE MILLIONS OF OPERATIONS

with Allen-Bradley Limit Switches

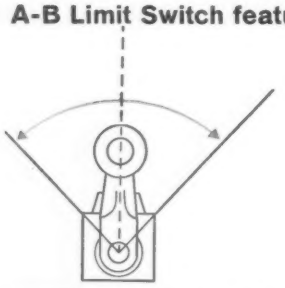
There's nothing now on the market to match the reliability and trouble free performance of Allen-Bradley Bulletin 802T limit switches. They are completely oiltight—operating heads and switch bodies are sealed against oils, coolants, and metal chips. Operators cannot become sluggish or "stick" in operation—contacts cannot become fouled. The double break, silver contacts are always in perfect operating condition—and remain so without maintenance.

Insist on Allen-Bradley—the *quality* line of limit switches that will give you *many more millions* of trouble free operations.

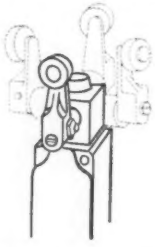


Bulletin 802T Micrometer Adjustment Roller Lever Limit Switch ▲

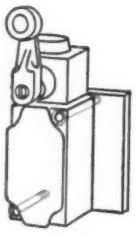
A-B Limit Switch features mean more life, more dependable trouble free service

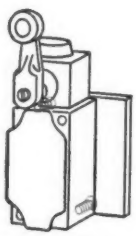


REPETITIVE ACCURACY—Unique toggle blade action assures operation at precisely the same point each time, without adjustment.



FLEXIBILITY—All operating heads can be rotated and fastened in any of four positions 90° apart.





FRONT MOUNTING **REAR MOUNTING**

All Allen-Bradley Limit Switches can be mounted either from the front . . . or from the rear.

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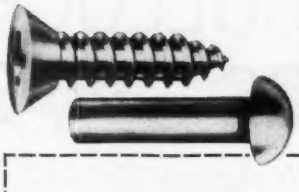

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Direct Costs: these include direct dollar savings as realized by the McCulloch Corporation . . . an "every day" job for Acme-Gridleys.

Indirect Costs: effecting important savings in maintenance, downtime, scrap reduction, tool costs, etc.

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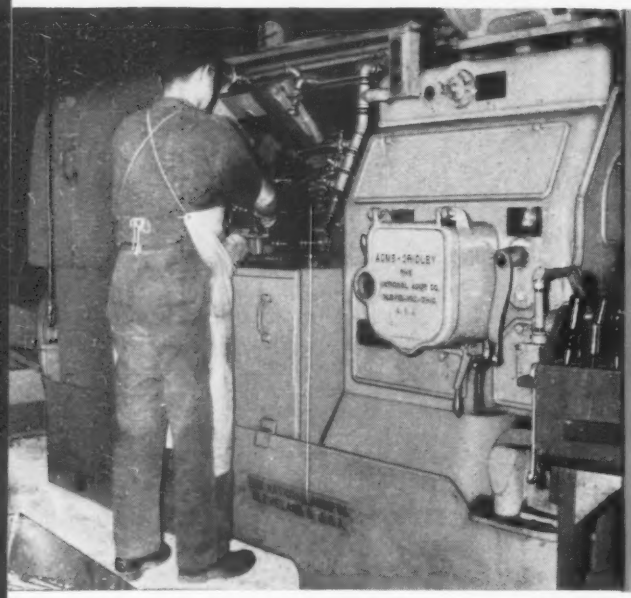
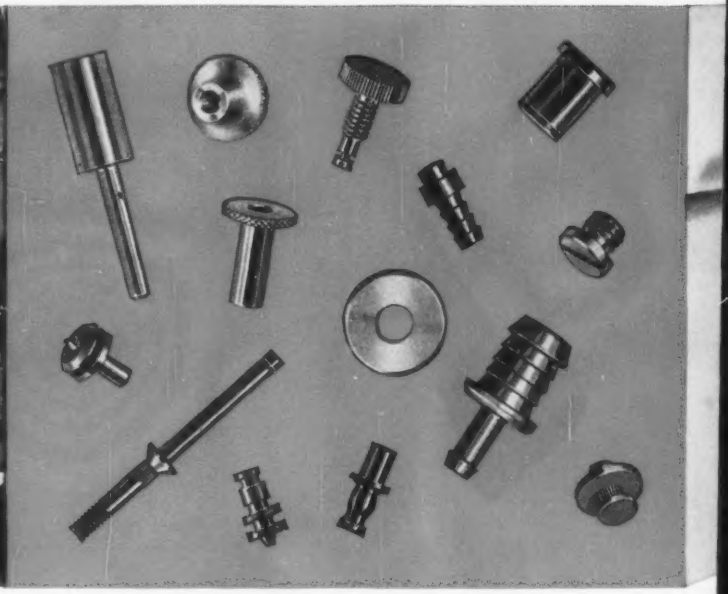
Direct Material Costs: our engineers provide important savings in this area by constantly matching machines and tools to modern metallurgical problems.

Make-or-Buy Reviews: in many cases our Contract Division can assume your production headaches and relieve you of immediate capital investment.

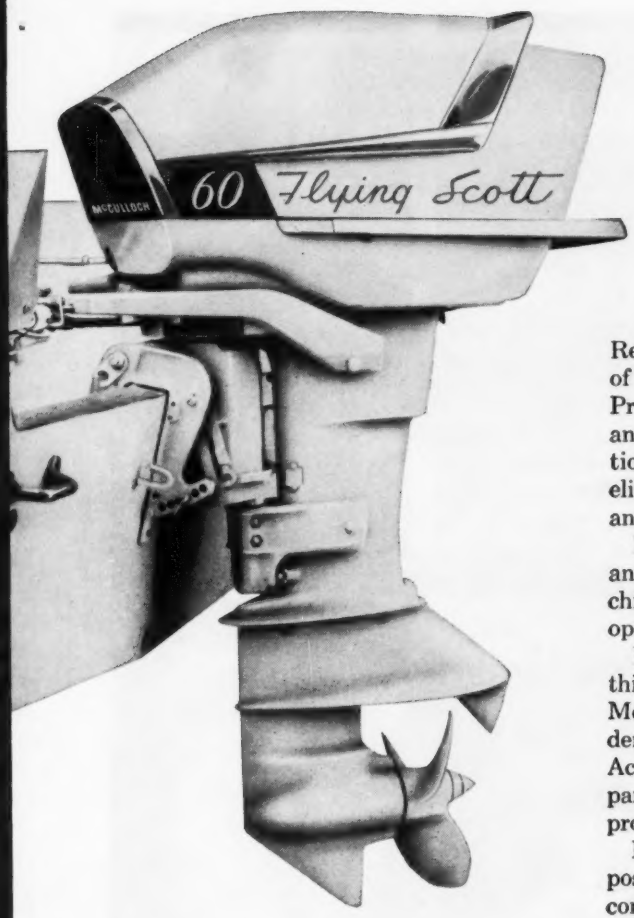
Spot Modernization: pioneering in modern tooling methods, and the flexibility of Acme-Gridleys can provide many "on-the-spot" savings.





McCULLOCH CORPORATION LOGS 66% COST REDUCTION

. . . with Acme-Gridleys



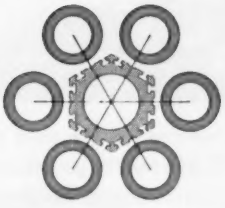
Reduced cost-per-piece of tilt-lock knobs was but one of the enviable savings made possible for the Marine Products Division of the McCulloch Corporation by an Acme-Gridley RA-6 Spindle Automatic. In addition, McCulloch boosted output 200%, practically eliminated scrap losses, and greatly improved finish and final appearance of this small but critical part.

Previous production methods required one primary and two secondary operations. Now, complete machining—including deburring, is done in one automatic operation on the Acme-Gridley.

Dramatic savings in the production of parts like this make Acme-Gridleys a vital, cost-saving cog in McCulloch's highly efficient production set-up. Evidence of this leading manufacturer's high regard for Acme-Gridley efficiency is the fact that 14 different parts for their popular 60HP "Flying Scott" are produced on the rugged, versatile RA-6 Automatic.

It will pay you to thoroughly study the savings possible with Acme-Gridleys. Call, write or wire for complete details on industry's most modern approach to tangible cost reduction.

Pioneer in Circumferential Automation



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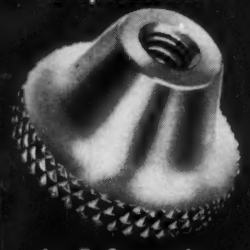
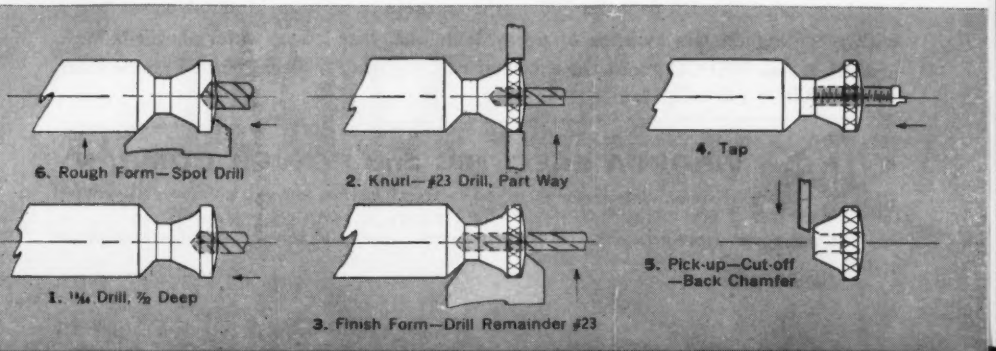
10 Operations



in 5 Seconds


6. Rough Form—Spot Drill
2. Knurl—#23 Drill, Part Way
4. Tap
1. 1¼ Drill, ⅞ Deep
3. Finish Form—Drill Remainder #23
5. Pick-up—Cut-off —Back Chamfer

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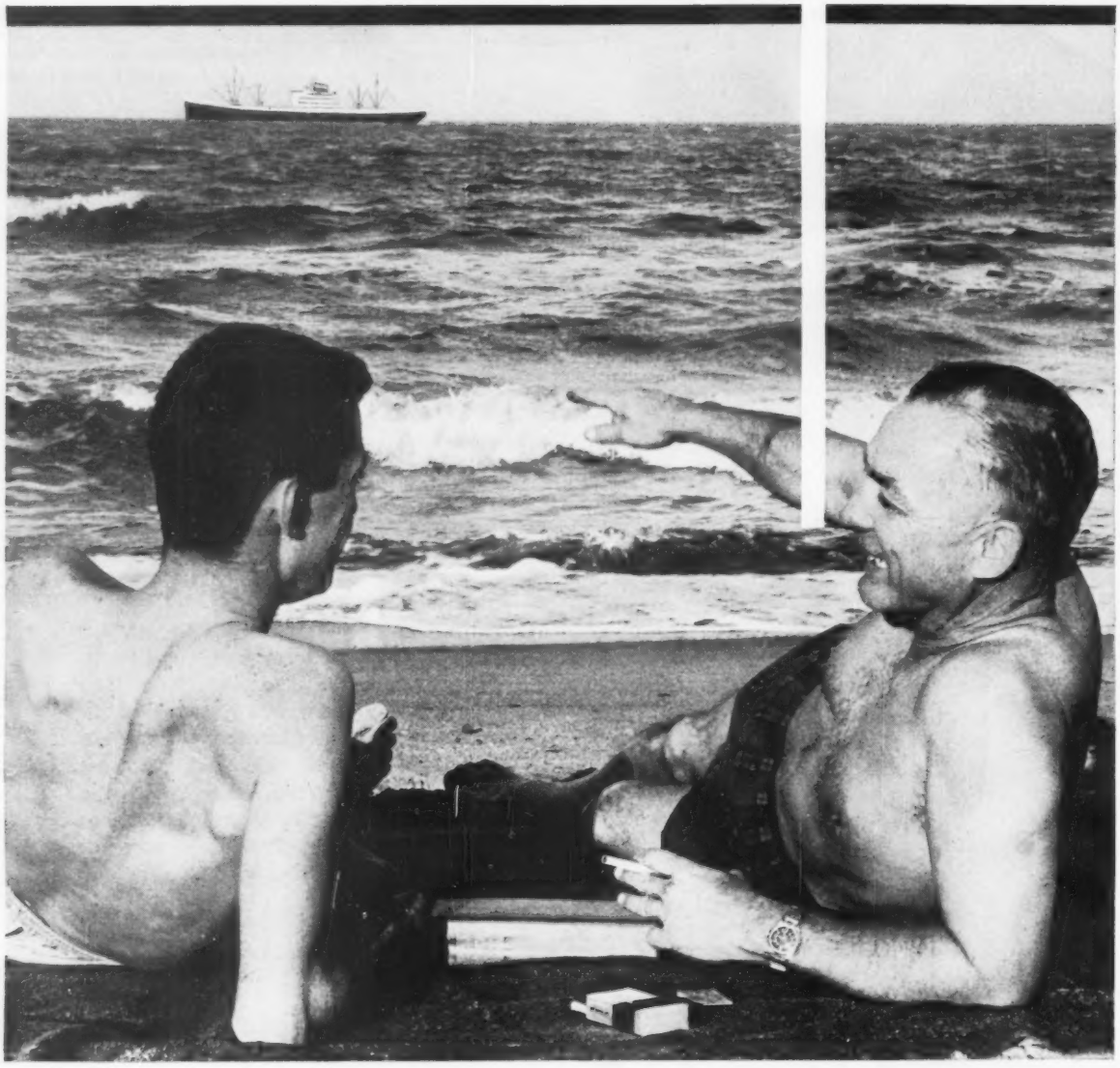

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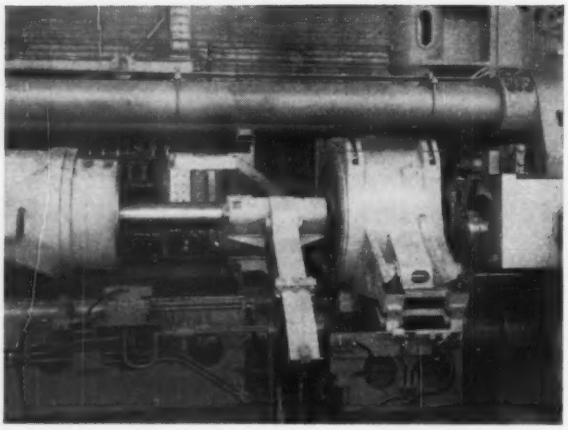

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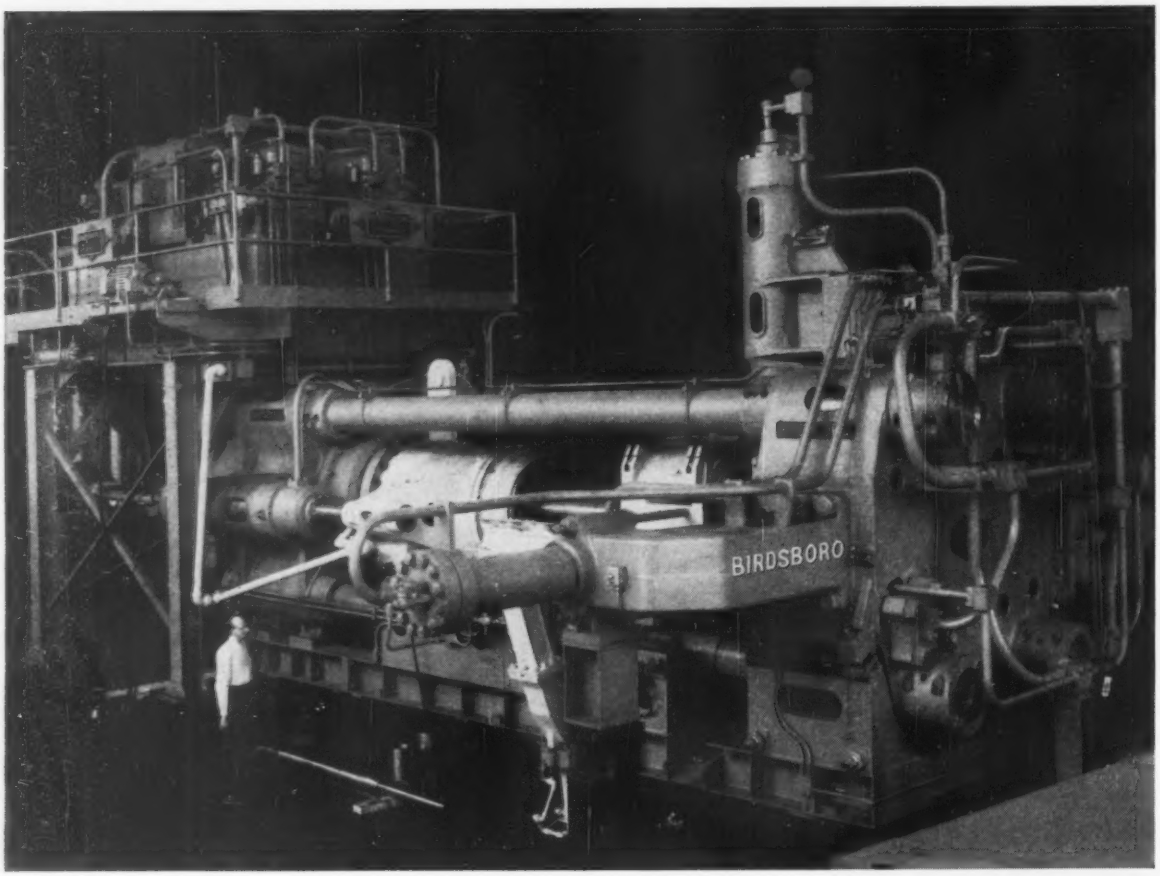

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500 HEATS!

AT J&L–ANOTHER EXCELLENT ROOF RUN WITH HARBISON-WALKER MAGNEX OHR

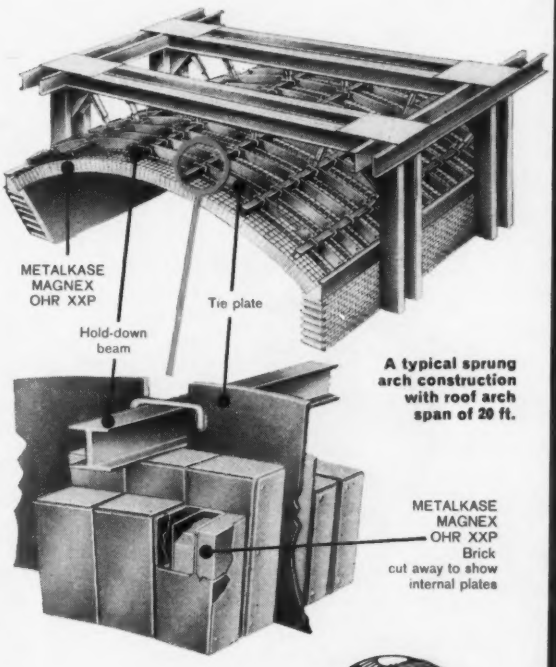
J. & L.'s No. 89 open hearth furnace—with Harbison-Walker METALKASE MAGNEX OHR XXP (former name METALKASE 29-57 XXP) recently completed a run of 500 heats. Unit roof life set a record of 548 heats.

These significant performance records at Jones & Laughlin Steel Corporation's Cleveland Works reflect credit to furnace operation, to construction and to the quality of the brick used in the roof.

METALKASE MAGNEX OHR XXP is an internally plated metal-encased basic brick used for both sprung and suspended open hearth roof constructions of all designs. Excellent service and tonnage records are regularly secured with both types.

The true value of a basic open hearth roof brick is measured by the cost per ton of steel produced. Split roof trials also provide an index to the relative brick qualities. By both standards, the superiority of METALKASE MAGNEX OHR XXP is being demonstrated repeatedly.

Another significant factor in modern open hearth practice arises from the fact that the successful use of basic brick for roofs contributes to greater severity of conditions imposed upon other furnace parts. Here too, the answer is in basic refractories. Harbison-Walker's long-established basic products with their unequalled service records, together with newer specialized brands, fulfill these more severe requirements for bottoms, walls and regenerator checkers, and make the ALL-INCLUSIVE, ALL-BASIC open hearth steel furnace a reality.



A typical sprung arch construction with roof arch span of 29 ft.

Harbison-Walker Refractories Co.

AND SUBSIDIARIES *World's Most Complete Refractories Service*

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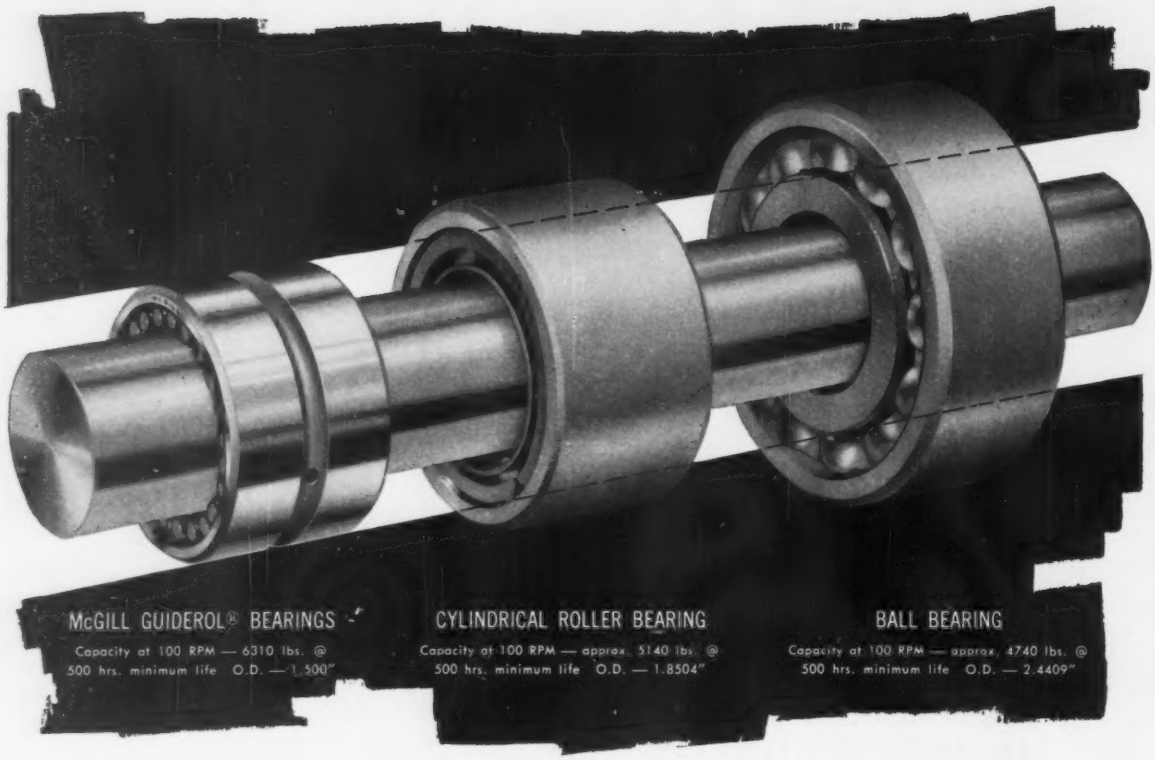
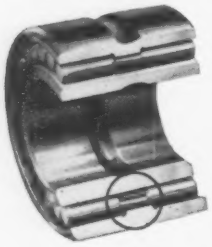
HW 60-10


McGILL GUIDEROL® BEARINGS
Capacity at 100 RPM — 6310 lbs. @ 500 hrs. minimum life O.D. — 1.500"
CYLINDRICAL ROLLER BEARING
Capacity at 100 RPM — approx. 5140 lbs. @ 500 hrs. minimum life O.D. — 1.8504"
BALL BEARING
Capacity at 100 RPM — approx. 4740 lbs. @ 500 hrs. minimum life O.D. — 2.4409"

GUIDEROL® BEARINGS SAVE RADIAL SPACE
.....and still offer greater load capacity

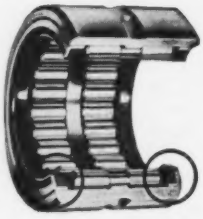
This graphic illustration demonstrates the radial space saving advantages of McGill GUIDEROL bearings that offer still greater capacity than the other two types of bearing compared. For a common 1" shaft, the GUIDEROL bearing GR-16 has an O.D. of only 1½" with a capacity of 6310 lbs. Compared to a cylindrical type roller bearing the GUIDEROL bearing requires ⅜" less housing space and offers 23% more capacity. A ball bearing for the same shaft uses almost an inch larger O.D. to carry 1500 lbs. less radial load.

CENTER GUIDED ROLLERS



GUIDEROL bearings pack more performance into smaller radial space. Their construction offers the inherent high capacity of a full complement needle bearing combined with effective roller control. Center guided rollers limit roller skewing tendencies and prevent binding under adverse conditions in either horizontal or vertical mountings. This qualifies GUIDEROL bearings for applications which are too heavily loaded for retainer type needle bearings, but are subject to misalignment that precludes the use of unguided needle bearings. Standard GR series GUIDEROL bearings are available, with or without inners, in shaft sizes from ⅝" to 9¼" with capacities ranging from 2880 lbs. to 128,670 lbs. (at 100 RPM).

LUBRICATION LOCKED IN, CONTAMINATION OUT; IN SEALED GUIDEROL BEARINGS



Pre-lubricated and sealed SG series GUIDEROL bearings are interchangeable dimensionally with standard GR series GUIDEROL bearings. They offer 5 possible seal combinations. Specify the sealed bearings for applications that are exposed to dust, dirt, grit or where accessibility for lubrication is a problem. Your McGill representative will be happy to assist you with special application problems. Ask him for recommendations or write the McGill Engineering Department.

For Complete Data on Dimensions, Capacities and Application of McGill Precision Needle Bearings, Send for Free Catalog No. 52A.

engineered electrical products

McGILL®

precision needle roller bearings

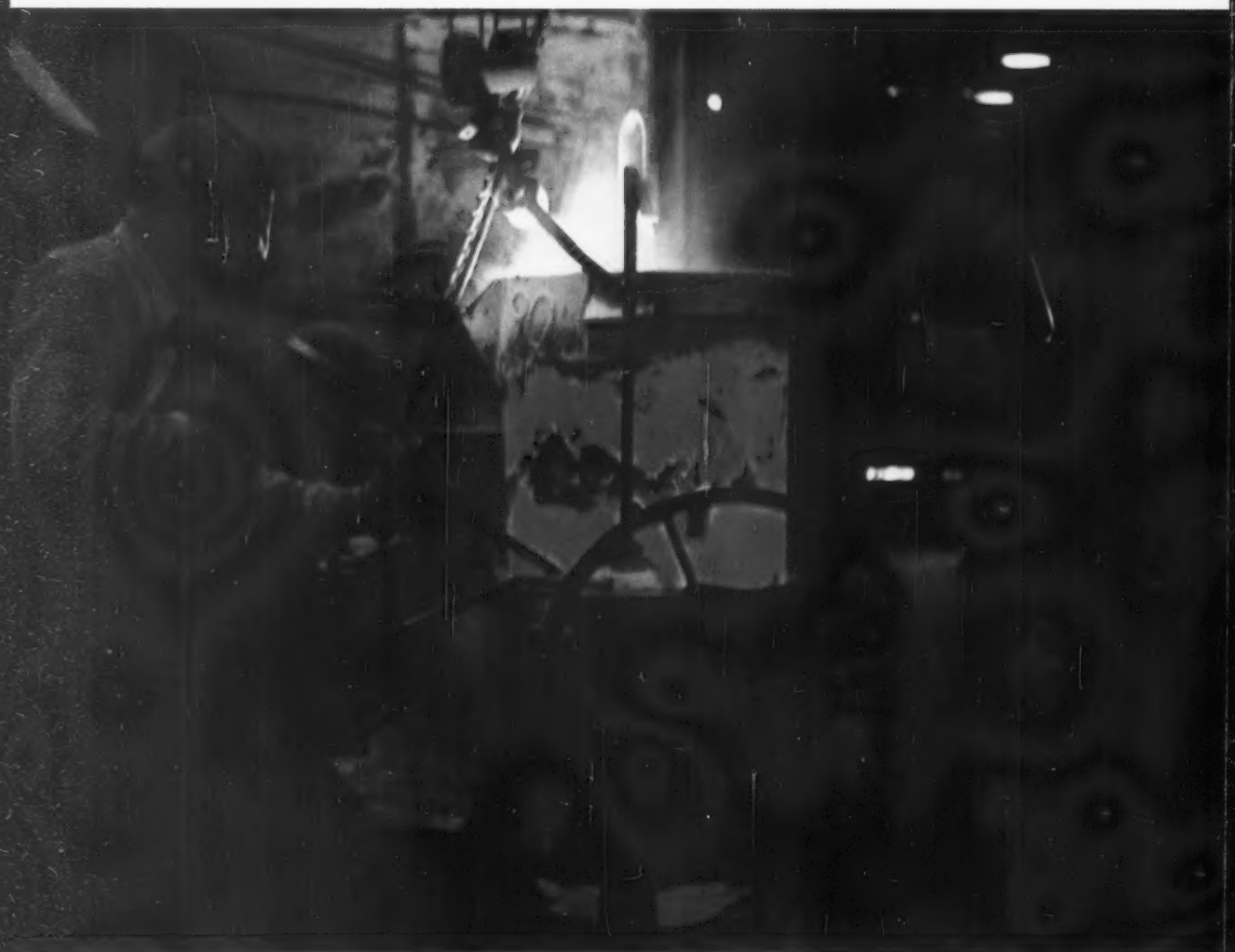
McGILL MANUFACTURING COMPANY, INC., BEARING DIV., 301 N. LAFAYETTE ST., VALPARAISO, INDIANA

This is The Dow Metal Products Company

FULLY EQUIPPED FOUNDRY

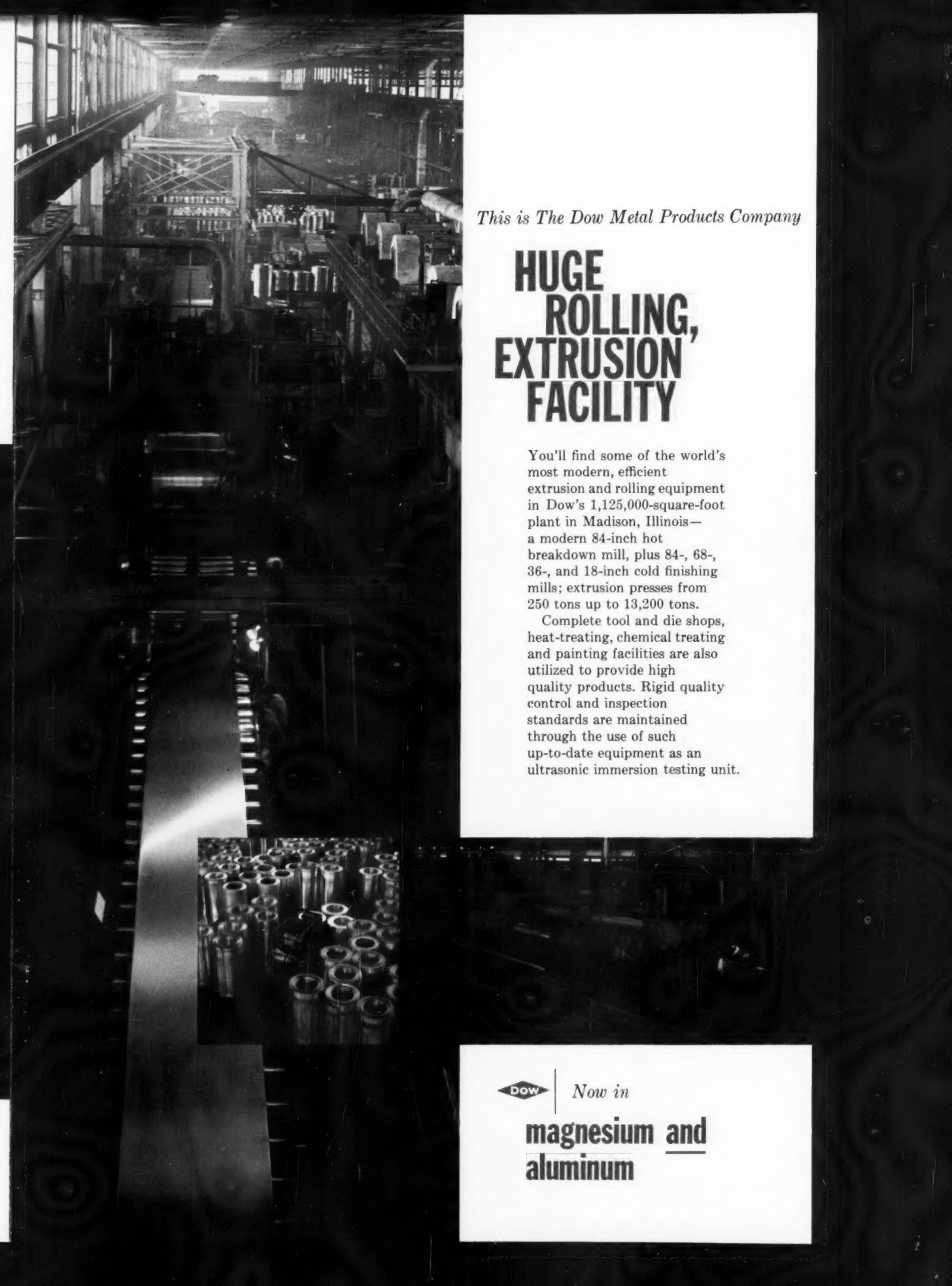
35 years' experience in complex sand and permanent mold castings . . . machine tools for cleanup . . . the most modern techniques. All this, and more, at Dow's Bay City foundry. You'll gain, too, from experience which spans the field from pattern engineering to modern inspection methods . . . X-ray, fluorescent penetrant, and direct reading spectrometer.

Thin wall castings, tubeless passageway castings, and enclosed shapes are but a few examples of this foundry's capabilities.



DOW **THE DOW METAL PRODUCTS COMPANY**

Division of The Dow Chemical Company



This is The Dow Metal Products Company

HUGE ROLLING, EXTRUSION FACILITY

You'll find some of the world's most modern, efficient extrusion and rolling equipment in Dow's 1,125,000-square-foot plant in Madison, Illinois—a modern 84-inch hot breakdown mill, plus 84-, 68-, 36-, and 18-inch cold finishing mills; extrusion presses from 250 tons up to 13,200 tons.

Complete tool and die shops, heat-treating, chemical treating and painting facilities are also utilized to provide high quality products. Rigid quality control and inspection standards are maintained through the use of such up-to-date equipment as an ultrasonic immersion testing unit.

DOW | *Now in*

magnesium and aluminum

This is The Dow Metal Products Company

NEW DIE CASTING PLANT

Economy in production marks Dow's new plant at Bay City, Michigan, thanks to efficient plant layout and advanced die casting technology and equipment. For example, a Dow-developed device automatically meters magnesium to machines. Result—increased production rate. And one of the country's largest casting machines is at work here.

Among this plant's invaluable advantages are highly trained men with rich experience in all sizes and types of die castings, backed by a fully qualified and well equipped quality control department.

DOW

THE DOW METAL PRODUCTS COMPANY

Division of The Dow Chemical Company

For more information, contact the Dow sales office near you or write to THE DOW METAL PRODUCTS COMPANY, Midland, Michigan, Merchandising Dept. 1041 LE5-9.

This is The Dow Metal Products Company

COMPLETE FABRICATION PLANT

Dow's Bay City fabrication plant offers complete production facilities for magnesium, aluminum, and magnesium-aluminum assemblies.

Included are deep drawing, forming, bending, joining, stamping, piercing, machining, arc and spot welding, assembly, chemical treatment and painting.

Engineering and production know-how combine to give best results on large and small jobs, and for development work, too!

magnesium and aluminum

- die castings • mill products
- sand and permanent mold castings
- extrusions • fabrications backed up by:
- over 40 years' experience in light metals
- research in alloys, processes and uses
- experienced technical service
- modern quality control techniques

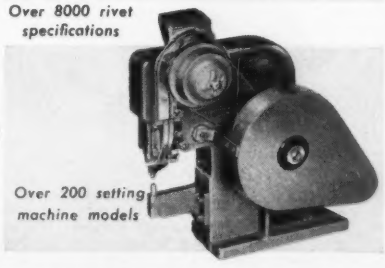
Manufacturers of America's best made products use millions of Thomson Rivets each year . . . because value analysis proves that rivets belong in product-improvement and cost-reduction programs.

When you specify Thomson Rivets, you get cold-formed strength, dimensional accuracy and faster assembly. You get lower total fastening costs inherent in machine-set rivets. You also get the extra benefit of 75 years' experience in keeping rivets and rivet-setting machines in step with industrial progress.

Since 1885, Thomson has developed more than 8,000 rivet specifications and more than 200 machine models. They provide ready answers to special and routine fastening problems.

On-the-spot assistance by your nearby Thomson Fastening Man, listed in the Yellow Pages, simplifies selection of the rivet-and-machine combination that will improve your products and cut your costs. Send for your free copy of "Cost-Cutting Facts about Fastening with Rivets", address your letter to Dept. 525 . .

Over 8000 rivet specifications



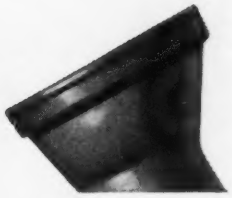
Over 200 setting machine models

JUDSON L. THOMSON MFG. CO.
WALTHAM 54, MASSACHUSETTS
Thomson (Canada) Rivet Co. Ltd., Gananoque, Ontario

NEW YORK • ILLINOIS • INDIANA • OHIO • MICHIGAN • PENNSYLVANIA • CALIFORNIA • FLORIDA • TEXAS • SOUTH CAROLINA • MISSOURI

FOR THE MACHINERY PART

THAT TAKES THE BEATING



HAYNES Alloys *will do the job!*

Perfect performance for 100,000 hours at orange heat, in the combustion chambers of diesel engines, is quite an achievement. Yet it's the record of tens of thousands of special combustion cups of HASTELLOY alloy C in a well-known line of diesels.

The alloy was chosen for its unique high-temperature strength and corrosion resistance and its outstanding ability to hold heat.

These and other special properties are built into HAYNES alloys —to fit the particular needs of design and production engineers for machinery parts that must meet the roughest service conditions.

If you are designing such a part, investigate HAYNES alloys. There are more than 15 to choose from. They include HAYNES STELLITE cobalt-base alloys, HAYNES iron-base alloys, HAYSTELLITE cast tungsten carbide, and HASTELLOY nickel-base alloys. They are available as castings, forgings, completely fabricated parts, or as sheet and bar stock. All parts can be furnished machined or ground to specified size and finish.

HAYNES ALLOYS

HAYNES STELLITE COMPANY
Division of Union Carbide Corporation
Kokomo, Indiana

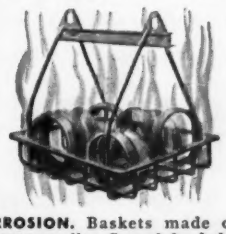
UNION CARBIDE

Address inquiries to Haynes Stellite Company, 420 Lexington Avenue, New York 17, N. Y.

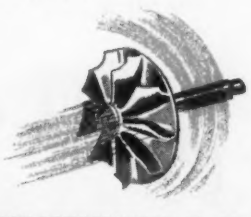
The terms "Haynes," "Haynes Stellite," "Hastelloy," "Haystellite," and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

TYPICAL "HAYNES" ALLOY PARTS THAT RESIST...

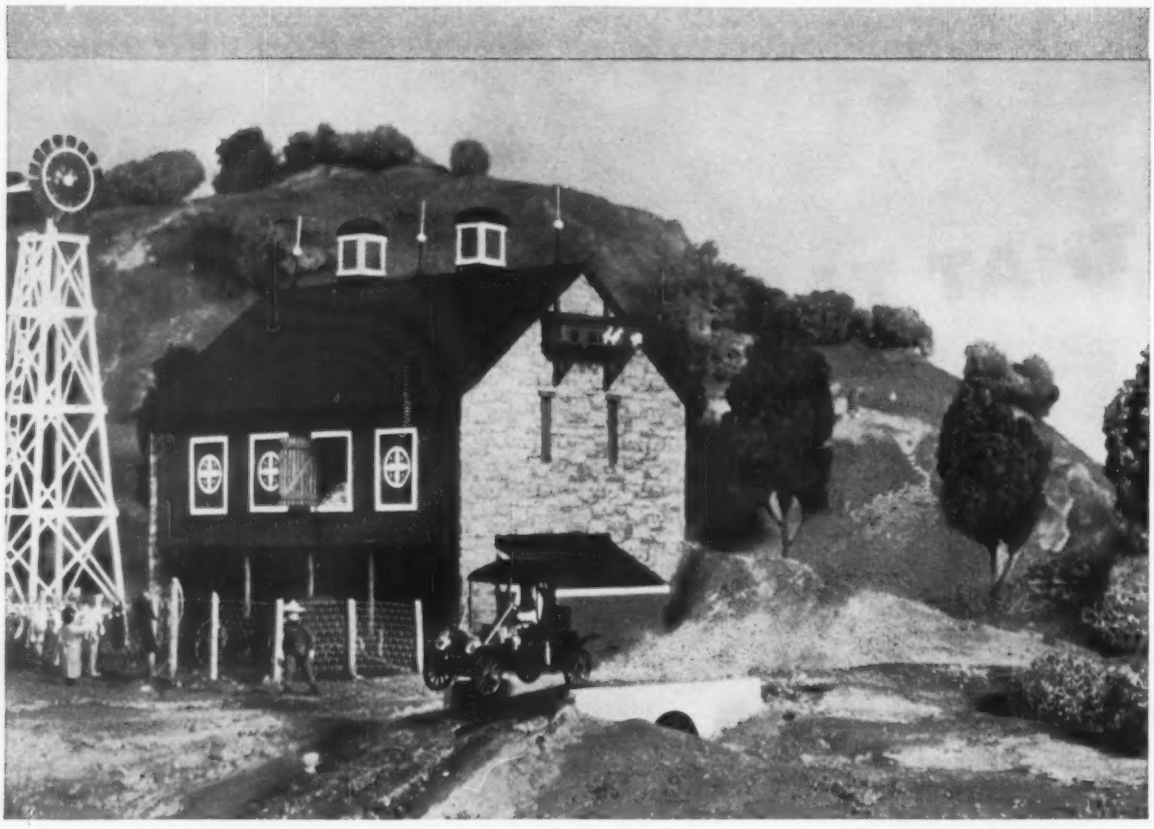
ABRASION. Ten times the life and still no sign of wear, is the record of this plastics-extrusion torpedo nose made of HAYNES STELLITE alloy No. 3. This is one of many HAYNES wear-resistant alloys.



CORROSION. Baskets made of HASTELLOY alloy C used for holding forgings during acid treatment, are still good after 15 months of service. Materials formerly used were replaced every month.



HIGH TEMPERATURE. Turbine wheels in the "hot" ends of diesel engine turbochargers are investment-cast of HAYNES STELLITE alloy No. 31, for service at speeds up to 50,000 rpm. at 1500 deg. F.

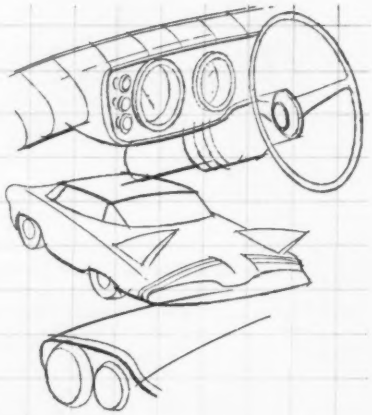


Custom Made OSTUCO Tubing..... gets your product off the ground

OSTUCO tubing is the exact tubing you need for your product because OSTUCO Tubing is CUSTOM MADE for your product. Your order is manufactured to your own specifications to produce steel tubing especially for your application—the precise grade, analysis, size, shape, special anneal and tolerances best suited to your own needs.

Ohio Seamless Tube produces both seamless and electric welded steel tubing—is prepared to form many finished or semi-finished tubular parts to your designs.

To get the most from your next steel tubing order, use Custom Made OSTUCO TUBING. Contact your nearest Ohio Seamless representative, or send part drawings to the plant at Shelby, Ohio—Birthplace of the Seamless Steel Tube Industry in America.



A-2108A

Model illustrated built to 3.5 mm scale.

SEE US AT BOOTH 629—DESIGN ENGINEERING SHOW MAY 23-26

OSTUCO SHELBY, OHIO

OHIO SEAMLESS TUBE

Division of Copperweld Steel Company • SHELBY, OHIO

Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

SALES OFFICES: Birmingham, Charlotte, Chicago (Oak Park), Cleveland, Dayton, Denver, Detroit (Huntington Woods), Houston, Los Angeles (Lynwood), Miami, Moline, New Orleans (Chalmette), New York, North Kansas City, Philadelphia (Wynnewood), Pittsburgh, Rochester, St. Louis, St. Paul, Salt Lake City, Seattle, Tulsa, Wichita

CANADA: Railway & Power Engr. Corp., Ltd. EXPORT: Copperweld Steel International Company, 225 Broadway, New York 7, New York

From school room to tool room an investment in Hevi-Duty Furnaces pays triple dividends

Your first dividend comes when you call a Hevi-Duty Sales Engineer. He is far more than a "nuts and bolts" salesman. He is qualified to lay out the most efficient over-all heat processing system for you. His services are yours for the asking.

Your second dividend comes with units that fit your system *exactly*. Better yet, they may well be standard designs for they come from the most complete line of electric and fuel-fired furnaces and ovens available.

Your third dividend is rugged, heavy-industrial quality. No one would say Hevi-Duty furnaces will *never* wear out, but hundreds of old-time users are still wondering *when*.

Why not call a Hevi-Duty Sales Engineer to discuss your heat-processing problems? These users did. Now they are enjoying the dividends.

HEVI-DUTY

Electric and Fuel-Fired Industrial Furnaces and Ovens

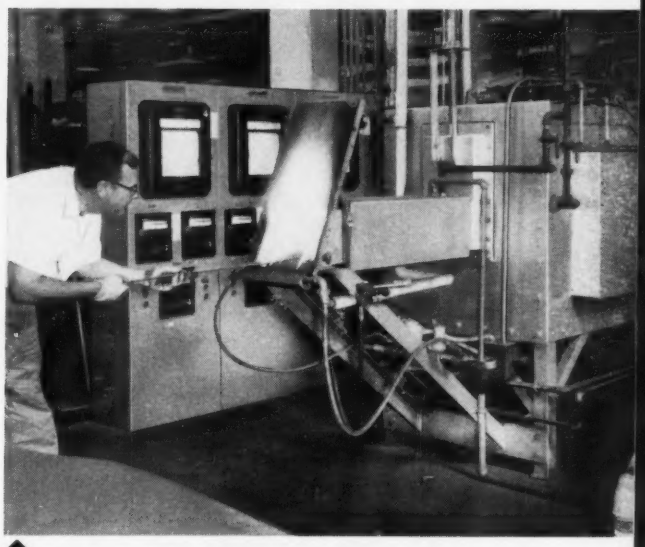
B P C

A Division of Basic Products Corporation

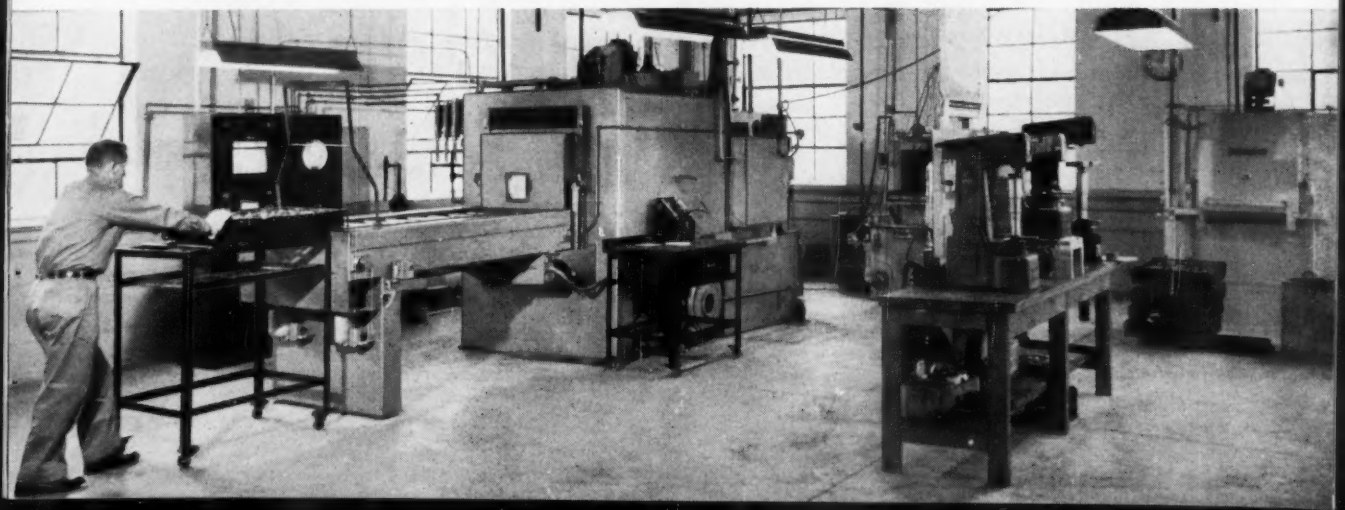
Hevi-Duty Electric Company, Milwaukee 1, Wis.

Adult education classes in a Wisconsin high school use this Hevi-Duty 051-PT muffle furnace for copper enameling. In constant use for 12 years, it still has all four original heating units. Clean, safe, and easy to operate, this furnace provides uniform chamber heat with negligible heat loss despite frequent door openings. ***For complete information on this muffle furnace, write for Bulletin 849.***

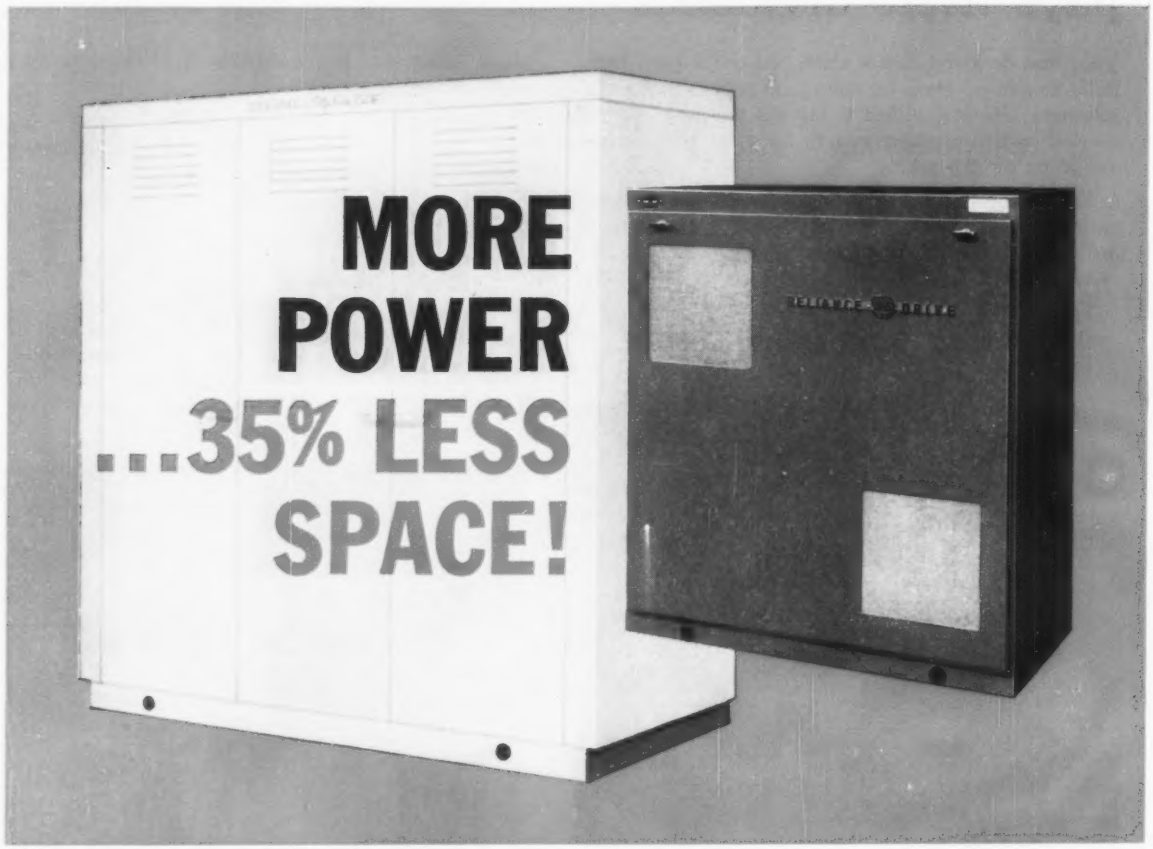
Bedford Gear and Machine Products Co., Bedford, Ohio, eliminated $1,000 per month in scrap losses with this Hevi-Duty Clean-Line automatic heat-treat unit. This heat-treating system includes enclosed quench furnace, washer, atmosphere draw furnace, and endothermic generator. ***For more information, please send for Bulletin D-100.***



Burroughs Corp., Plymouth, Michigan, reports no scale, no oxidation, and no distortion on high-speed tools and dies hardened in this Hevi-Duty high-temperature furnace. It has two zones of control, a water-jacketed cooling chamber, and maintains uniform temperatures up to 2300°F. ***For more complete information, please send for Bulletin 653.***



Reliance Super 'T' V★S Drives



Both of these control units are rated at 50 horsepower! Actually, the new, small Super 'T' V★S cabinet packs more punch!

LIKE the Reliance Super 'T' Drive Motor, new V★S power units utilize Class B insulation, permitting a more compact unit. 100% overloads of one minute duration are accomplished without failure! Advanced design of ventilation keeps control and power units cooler . . . another reason why smaller size is possible. And service life is substantially extended.

Matched system design of drive motor, power unit and controls produces a highly efficient, integrated drive—to give you a wide range of stepless, variable operating speeds from a-c. circuits.

Super 'T' V★S Drives are available for immediate delivery. Check your Reliance salesman for delivery schedules on the full line, 1—350 hp., Bulletin Number D-2506, has been prepared to give you complete information. Write for it. D-1641

Product of the combined resources of Reliance Electric and Engineering Company and its Master and Reeves Divisions

RELIANCE ELECTRIC AND ENGINEERING CO.

DEPT. 45A, CLEVELAND 17, OHIO
Canadian Division: Toronto, Ontario
Sales Offices and Distributors in Principal Cities

Duty Master A-c. Motors, Master Gearmotors, Reeves Drives, V★S Drives, Super 'T' D-c. Motors, Generators, Controls and Engineered Drive Systems.

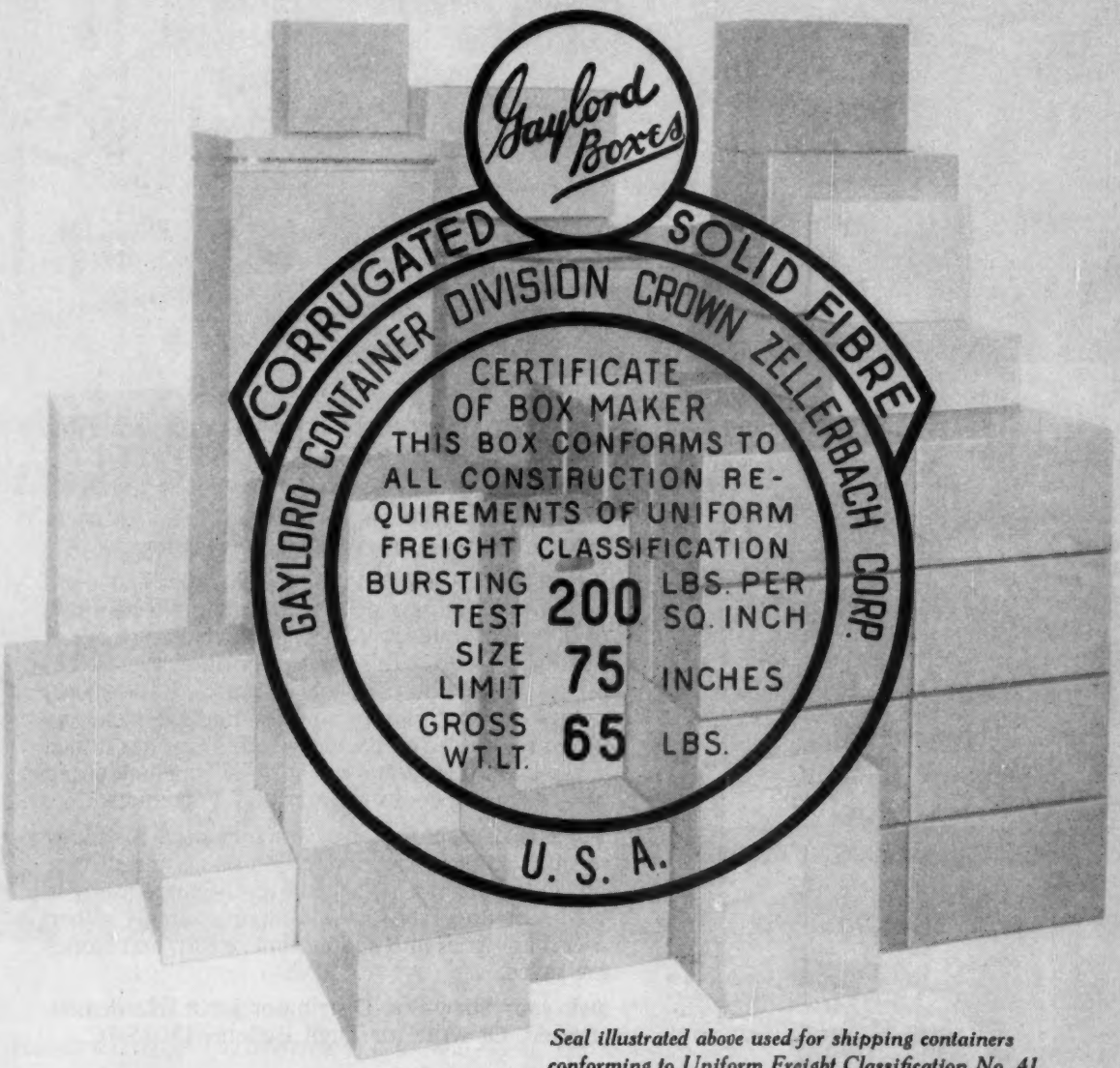
This is only one proof of GAYLORD *quality*

Here you read the measurable qualities in Gaylord Containers.

But how do you measure experience and ingenuity . . . which are *extra* qualities built into every Gaylord box?

Gaylord is part of a completely-integrated, nation-wide organization of packaging talents, devoted to delivering the most efficient, most economical container you can buy.

Your nearby Gaylord Man can prove this. Why not let him try?

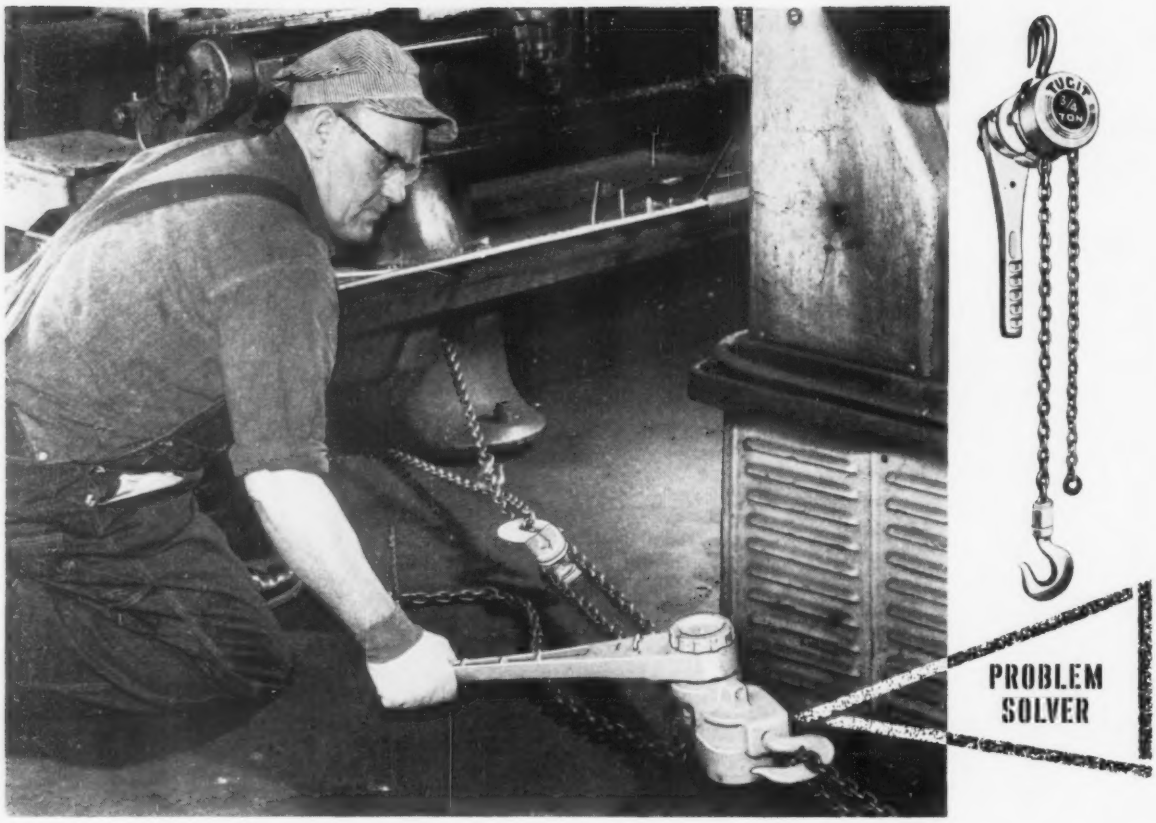


Seal illustrated above used for shipping containers conforming to Uniform Freight Classification No. 41.

CROWN ZELLERBACH CORPORATION
GAYLORD CONTAINER DIVISION

IN CANADA · CROWN ZELLERBACH CANADA, LTD. VANCOUVER, B. C.

HEADQUARTERS, ST. LOUIS
PLANTS COAST TO COAST



Tugit® gives men a work break that saves

Tugit is being used here to hold sections of channel steel together for welding.

Tugit can be operated in close quarters where a standard hoist can't be rigged.

Tugit is the compact, portable link chain hoist of countless uses — at any angle, anywhere.

Lifting and shifting jobs that formerly drained men's muscles and morale now yield to the powerful pull of Tugit. Maintenance men get a real work break when they operate this efficient hoist. It is geared to lift a ton with only 40 lbs. of muscle effort. They use it for everything from positioning overhead piping to relocating machinery. And, Tugit has a load brake like a regular hoist. The non-flying handle and non-fracturing hooks are other safety features.

Tugit is a problem solver whether used for maintenance or in production. Some plants install it to lift and lower pot furnace covers. Others use it to hold parts together for welding or assembly. Wherever Tugit goes into action, time, effort, and money are saved.

Ask your Shaw-Box Distributor for a free demonstration. Or write for Tugit Bulletin 15015-1C.

60 B-1

MANNING MAXWELL & MOORE INC. TRADE MARK

TUGIT HOISTS
A product of
MANNING, MAXWELL & MOORE, INC.
Shaw-Box Crane & Hoist Division • Muskegon, Michigan
In Canada: Manning, Maxwell & Moore of Canada, Ltd. • Galt, Ontario

Strong Restraining Influences...

Roebling Hose Reinforcing Wire

Roebling Hose Wire, Hose Reinforcing Wire and Hose Wrapping Wire bear the stamp of Roebling's strict attention to constant uniformity. As with all Roebling wire products, each is wholly Roebling-made and Roebling-controlled, from open hearth to packaging. Tensile strength and forming qualities, finish and gage are of an excellence that proves itself in use.

Resistance to internal and external pressures and wear are what you look for in hose wires and what you pay for. With Roebling, you *get* them.

For further information on these and other Roebling quality products, write or call Roebling's, Wire and Cold Rolled Steel Products Division, Trenton 2, New Jersey.

Roebling... Your Product is better for it

ROEBLING

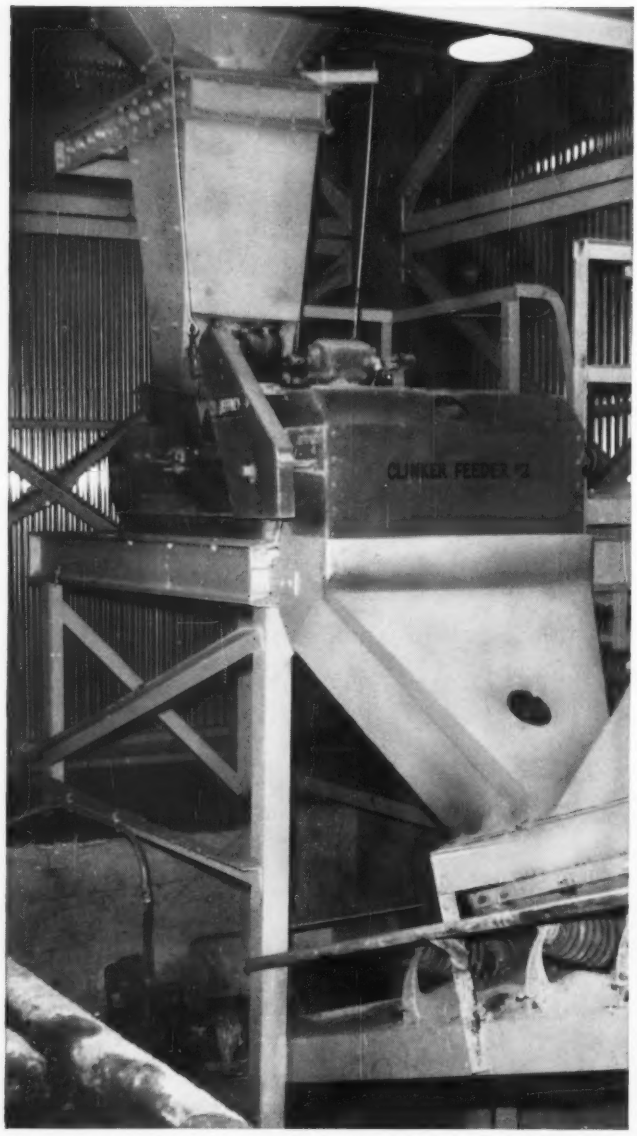
Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation

JEFFREY Weigh-Feeding helps achieve peak efficiency in new cement plant

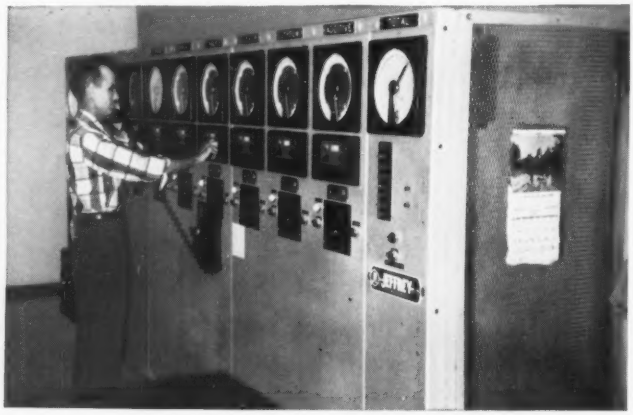
Arkansas Cement Corporation in Foreman, Arkansas has one of the nation's most modern and highly automated cement plants. Designed and built by Kaiser Engineers of Oakland, California.

JEFFREY WAYTROLS®—machines which weigh materials as they feed them—were integrated into the automated system for handling the dry raw materials. These units continuously and automatically proportion by weight and feed materials to the various functions in the mill building. Complete instrumentation of this feeding equipment permits immediate adjustments as required in processing.

If you're interested in automating your conveying and processing operations and lowering costs, it will pay to consult Jeffrey. For information, write The Jeffrey Manufacturing Company, 889 North Fourth Street, Columbus 16, Ohio.



Jeffrey Waytrols like this one continuously proportion and feed chalk, iron ore, additive materials, clinker and gypsum at the huge Arkansas Cement plant; capacity is 1,400,000 barrels per year of Foreman Portland Cement and similar products.



One of two panels of Jeffrey instruments from which feed rates of individual Waytrols are controlled. Total feed rates can also be adjusted for overall-mill control.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT...
TRANSMISSION MACHINERY...CONTRACT MANUFACTURING

BLAW-KNOX

Blaw-Knox designs and builds slabbing-blooming mills in a complete range of sizes in universal and high lift types. Other Blaw-Knox equipment for the metals industry includes complete rolling mill installations and auxiliary equipment for ferrous and non-ferrous metals, sheet and strip processing equipment, electrolytic tinning, annealing, and galvanizing lines, seamless pipe and tube mills, draw benches, and cold draw equipment, Blaw-Knox Medart cold finishing equipment, iron, alloy iron and steel rolls, carbon and alloy steel castings, fabricated steel plate or cast-weld design weldments, steel plant equipment, and heat and corrosion resisting alloy castings. Blaw-Knox Company, Foundry and Mill Machinery Division, Blaw-Knox Building, 300 Sixth Avenue, Pittsburgh 22, Pa.

46 x 90 inch Universal Slabbing Mill at the Fontana Works of Kaiser Steel Corporation.

"Only GAS gives quick, controlled, complete combustion"

Albert Holzwasser, President, Arrow Armatures, Boston

"Arrow Armatures is the largest rebuilder of automobile generators in the East. One of the important steps in rebuilding generators is burning the old insulation from the armature before it is rewound. Because gas gives quick heat that can be accurately controlled, it answers our need perfectly.

"We also have a gas-fired catalytic combustion unit to incinerate the smoke and fumes produced in burning off this insulation. Together these units give us complete, clean combustion with no smoke control problems," states Albert Holzwasser, President.

Quick, controlled, complete combustion—and the many other advantages of gas—can be yours, too. For technical information, see your Gas Company's Industrial Sales Engineer. He can show you the economies and results you'll get with modern industrial gas equipment. *American Gas Association.*

FOR PRECISE CONTROL, GAS IS GOOD BUSINESS!

For every foundry—best news in years!

Norton Resinoid Wheels Now Better Than Ever

Norton Foundry News

NORTON

BETTER SNAGGING WHEELS!

B11 Wheels BN Wheels BD Wheels

Equipment and quality control in new, multi-million

The great new Norton Worcester Plant No. 8 was built specifically to advance the manufacture and performance of resinoid wheels — the wheels foundries need and use most.

Norton Foundry News

Norton Foundry News

BIG NEW PLANT FOR RESINOID WHEELS!

Equipment and quality control in new, multi-million dollar Plant No. 8 are ultra-modern — maintaining "Touch of Gold" performance at highest efficiency and producing resinoid wheels that remove more metal per dollar and last longer. For example:

- B11 resinoid bonded wheels have more uniform structure and better balance, assuring faster, cooler grinding, plus smoother operation. Available in sizes and types for all jobs — on your swing frame grinders and floor stands down to smallest portables.
- BN and BNA straight wheels, reinforced with glass cloth, are strong and safe, excellent for cutting and notching gates and risers. Made in thinnesses down to 1/16" and 3/32".
- BD and BDA wheels, raised hub type, glass-nylon reinforced, are ideal for many cleaning, slotting and cutting operations.

On-the-job reports of how new Norton resinoid wheels are paying off in ferrous and non-ferrous foundries are in the new report, Norton High Speed Resinoid Wheels for the Foundry, shown here. Your copy is available from your local Norton Representative . . . and is as near as your phone. Call for it today. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

NORTON ABRASIVES

W-1968

75 years of . . . Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

If what you make is round or square or odd shaped

If you make it one at a time or by the millions

If you want to check its OD or its ID or a whole

lot of dimensions at once ...and if you want

the gage to indicate a dimension or flash a light

or ring a bell or a machine on the basis of tolerances

down to thousandths .001 or millionths .000001

SHEFFIELD can recommend the exact type of

Air, Electric, Electronic, Visual or Limit gages you need...

or a complete automatic gaging or assembly machine or system...

with dimensional quality control based on the

ultimate standard of gagemaking: **INTEGRITY**

The

SHEFFIELD

Corporation *Dayton 1, Ohio*

A subsidiary of the Bendix Aviation Corporation

Gages, Measuring Instruments, Automatic Gaging & Assembly Systems • Machine Tools • Contract Mfg.

Another example of National Roll quality control

John Patton, National's assistant sales manager and Joe Marsalka, metallurgist, look over the reflectoscope "profile" of a steel roll.

No flaw escapes this electronic eye!

Your steel rolls from National are given a thorough examination by reflectoscope before shipment. Ultra-high frequency sound waves traverse every segment of the roll, electronically assuring the absence of internal flaws which might shorten the roll's service life in your stand.

This attention to detail and emphasis on high quality of product are two reasons why more and more steel makers are turning to National for their steel, iron and nodular iron rolls. From the moment you call a National representative, your roll problem gets the *personalized* attention of men experienced in analysis, design and production.

We'd like to tell you more about how National Roll's expanded staff and facilities can serve you. Next best thing to a visit with us is a look at our new brochure. May we send you a copy? It helps explain why . . .

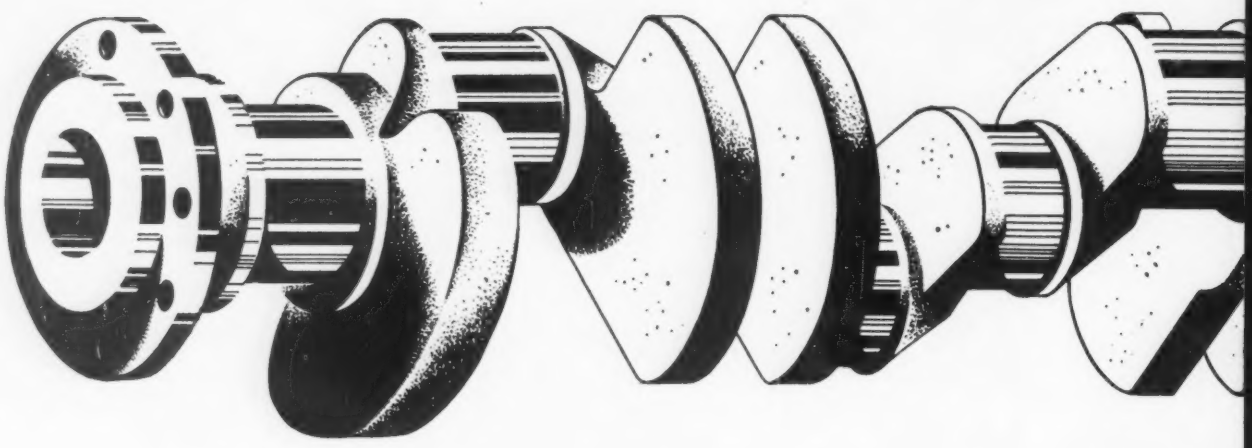
National's the growing name in rolls

NATIONAL ROLL & FOUNDRY DIVISION

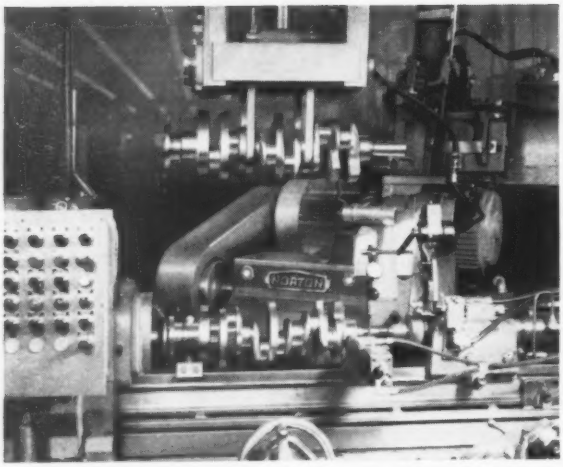
GENERAL STEEL CASTINGS CORPORATION, Avonmore (Westmoreland County), Pa.

General Steel Castings Corporation, General Offices: Granite City, Illinois • Plants: Granite City, Ill., Eddystone, Pa., Avonmore, Pa.

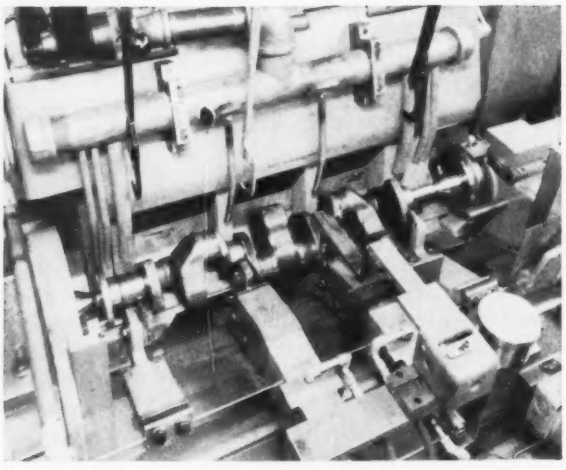
If you grind crankshafts . . .



check how NORTON grinders can reduce your costs-per-shaft



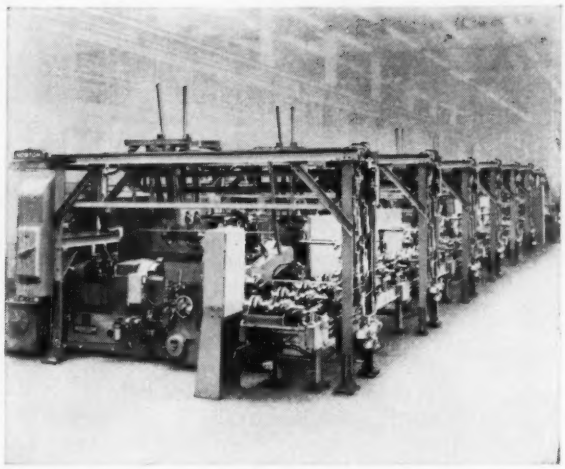
Grinding Gear Fits and shoulders is easily handled on a Norton Type C-V 4 Angular Wheelslide Grinder. By grinding thrust surface and adjacent diameter in a single, automatically controlled plunge grind, the Type C-V 4 provides fastest production with less effort.



Grinding All Main Bearings At Once is a job for the Norton Type CM-1 Semiautomatic Heavy Duty Multi-Wheel Grinder. Precise finishing of a group of line diameters about as quickly as a single diameter grind assures important cost-savings. Also popular in this multi-wheel application are Type CTU Heavy Duty Cylindrical Grinders.

75 years of . . . Making better products . . .

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

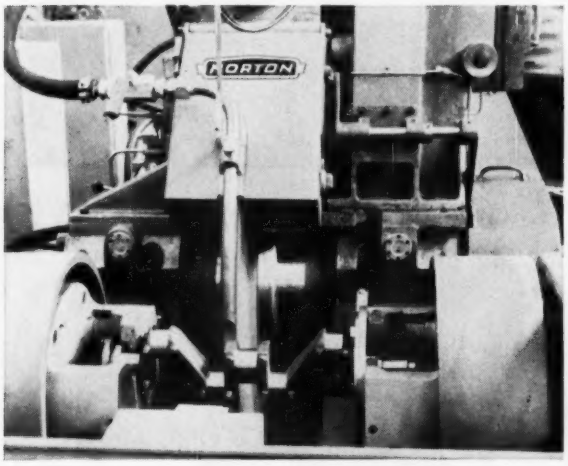


Automatic Grinding of Crankpins on a multi-station basis is handled on the No. 2 Unitized Transfer Type Crankpin Grinder. This machine combines loading, positioning, grinding, gaging, transferring and wheel-truing — a sensational advancement for big volume crankshaft production.

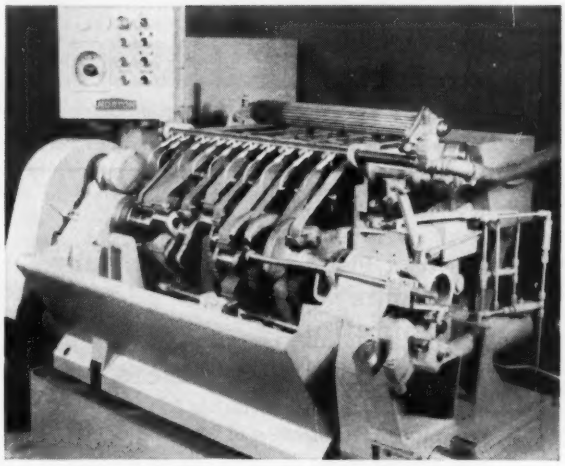
For further facts on how these grinders can benefit you, see your Norton Man, a trained grinding engineer. NORTON COMPANY, Machine Tool Division, Worcester 6, Mass. District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit. In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5.

NORTON
MACHINE TOOLS

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries



Simplified Grinding of Pins on shafts up to 72″ long is the specialty of Norton Type CC-8 CRANK-O-MATIC* Semiautomatic Crankpin Grinders. Automatic cycling under semiautomatic control frees the operator from supplementary operations. Similar advantages for grinding pins on small shafts are provided by Norton Type CTU CRANK-O-MATIC Grinders.



Lapping Pins and Bearings simultaneously in an automatic cycle calls for the Norton No. 31 CRANK-O-LAP* Lapping Machine. Strips of coated abrasive are used as the Lapping medium in producing top-quality finishes. With headstock and footstock carried as a swing frame, manual operation is reduced to easy loading, pushing the "Start Cycle" button and unloading.

to make your products better

MACHINE TOOL DIVISION: Grinding and Lapping Machines — **G & E DIVISION:** Shapers • Gear Cutting Machines • Gear Induction Hardeners

Every Worker

breathes easily when He Wears the AO "RED DEVIL" Respirator

Workers like the equipment because it's so easy to breathe through. The compact variable density Red Devil filter is extremely efficient. Safety budget dollars stretch farther because the respirator has a built-in pre-filter which lengthens service life.

The Red Devil illustrated is one of AO's inventory-reducing R2000 Single Filter Respirators offering 9 types of protection with one basic face piece. The R2090 Red Devil Respirator is approved by the Bureau of Mines for all dusts not significantly more toxic than lead, pneumoconiosis-producing mists and chromic acid mist.

NOTE: The Red Devil Filter is *red* in color and is an American Optical exclusive. Available in packages of 5 or 50.

American Optical
COMPANY
SAFETY PRODUCTS DIVISION
SOUTHBRIDGE, MASSACHUSETTS

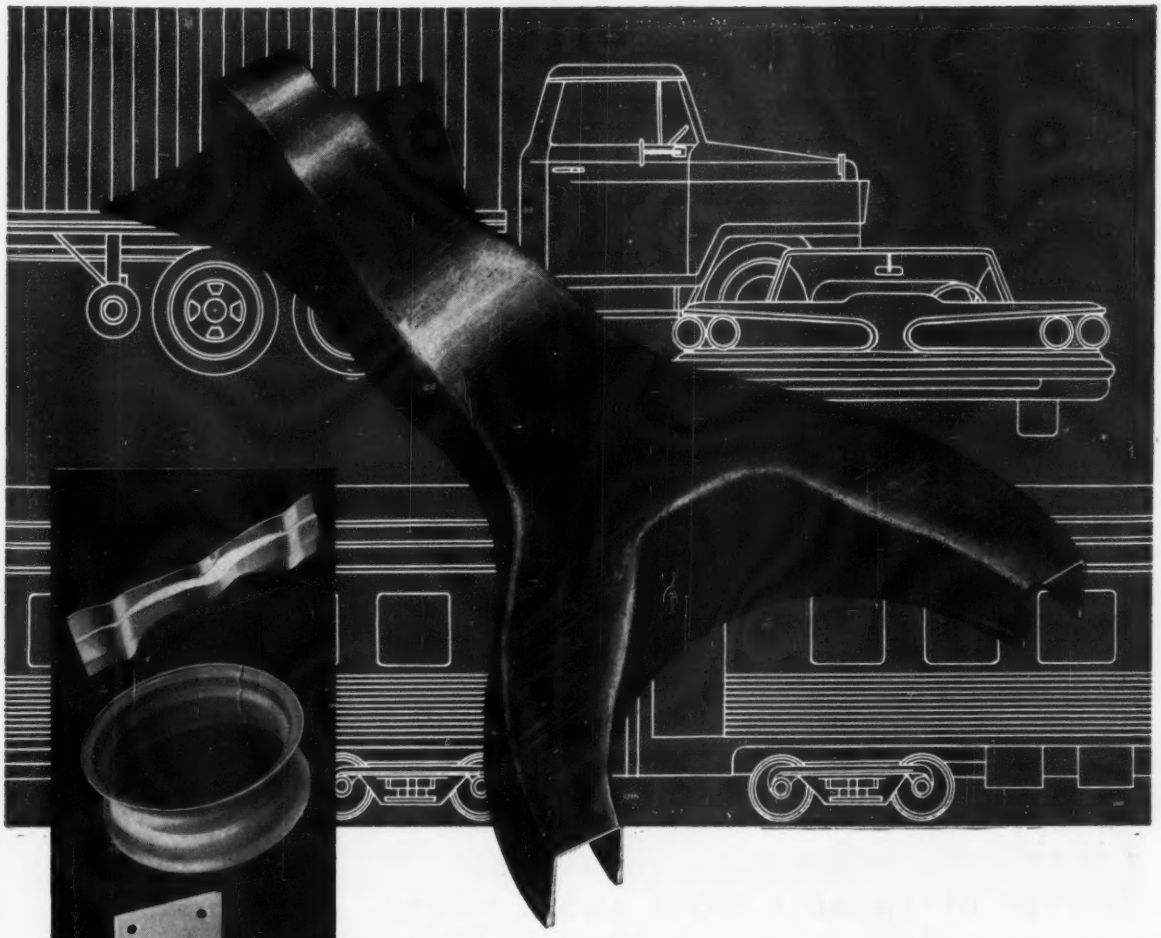
Safety Service Centers in Principal Cities
Always insist on Trade-marked Safety Products

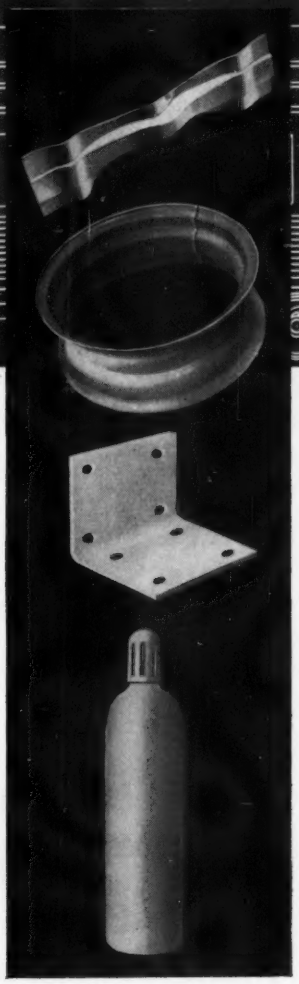
Protect Face and Respiratory Passages with this Combination

This Special Face Shield

of clear acetate easily attaches to the respirator for protection of eyes and upper face against flying particles. Shield is light and comfortable — can be worn over prescription glasses.
Catalog number is AO R-18.

Your surest protection...AO SURE GUARD Products





Columbium flat-rolled steels

Do you need a steel, to use in the "as rolled" condition? Or a steel which has high strength, good weldability, good formability?

More and more manufacturers are turning to columbium flat-rolled steel products, for columbium sheet, strip or plate gives an answer to all of these requirements.

Here are just a few examples of columbium steel's wide versatility. Line pipe for gas and oil offers ease of manufacture with excellent physical strength. Trucks, automobiles, farm implements, trailers and railroad cars take advantage of strength and ease of formability. Pressure vessels utilize the deep-drawing qualities of the steel. These applications and many others tell the story of columbium steel's versatility—and all with fewer rejects.

In the face of mounting manufacturing costs, columbium steels offer hope of effecting economies in producing your products. Ask any steel company for they can make it. Or ask us—we have a wide experience in its uses and knowledge of its manufacture.

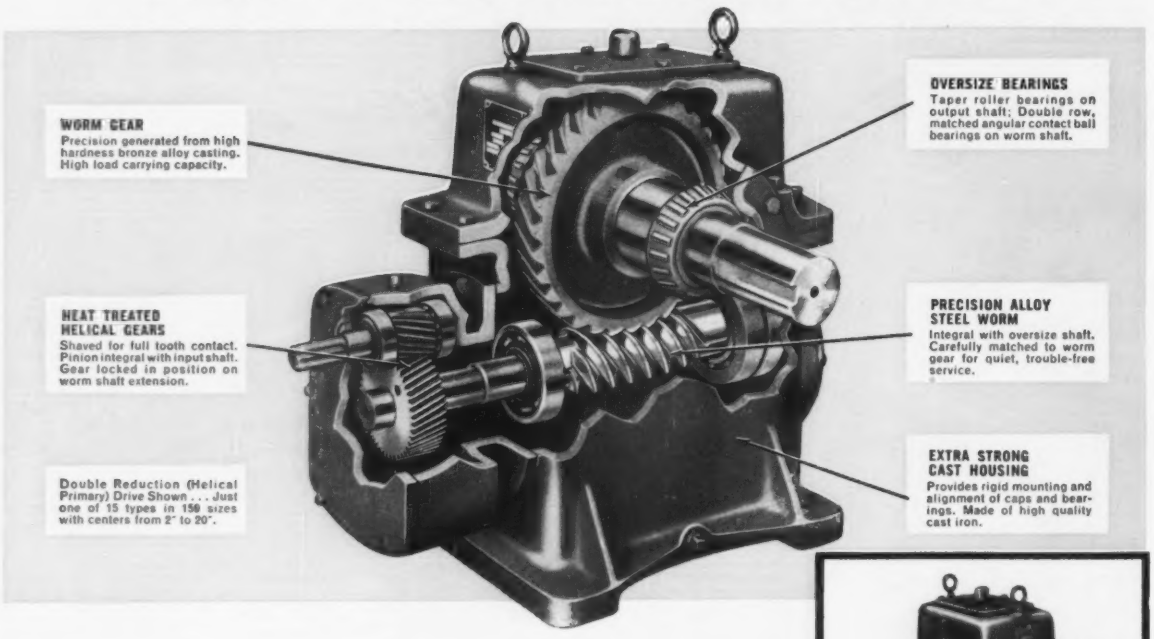
MOLYBDENUM

2 Gateway Center CORPORATION OF AMERICA **Pittsburgh 22, Pa.**

Offices: Pittsburgh, Chicago, Los Angeles, New York, San Francisco
Sales Representatives: Brumley-Donaldson Co., Los Angeles, San Francisco
Subsidiary: Cleveland-Tungsten, Inc., Cleveland
Plants: Washington, Pa., York, Pa.

MCA

From the ONE COMPLETE LINE of Power Transmission Drives....

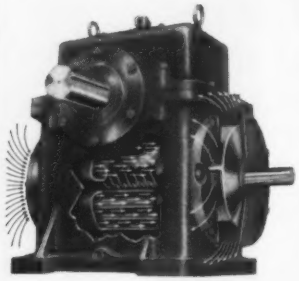

WORM GEAR
Precision generated from high hardness bronze alloy casting. High load carrying capacity.
HEAT TREATED HELICAL GEARS
Shaved for full tooth contact. Pinion integral with input shaft. Gear locked in position on worm shaft extension.
Double Reduction (Helical Primary) Drive Shown . . . Just one of 15 types in 150 sizes with centers from 2" to 20".
OVERSIZE BEARINGS
Taper roller bearings on output shaft; Double row, matched angular contact ball bearings on worm shaft.
PRECISION ALLOY STEEL WORM
Integral with oversize shaft. Carefully matched to worm gear for quiet, trouble-free service.
EXTRA STRONG CAST HOUSING
Provides rigid mounting and alignment of caps and bearings. Made of high quality cast iron.

FOOTE BROS. WORM GEAR REDUCERS DELIVER DEPENDABLE RIGHT ANGLE POWER

Gearing is the heart of any drive . . . and because more than 100 years of successful gear design and manufacturing experience go into every Foote Bros. Worm Gear Drive, they have built an unequalled reputation for performance, durability, and operating economy. Foote Bros. Worm Gear Drives are widely used in every industry in applications where dependability is a primary need.

If your drive problems involve right angle, concentric shaft, parallel shaft, or shaft mounted transmission of power, check the advantages of the complete Foote Bros. Power Transmission Line.

SINGLE REDUCTION DRIVES AVAILABLE WITH WORM UNDER OR OVER FOR HORIZONTAL OR VERTICAL MOUNTINGS.



FAN-COOLED SINGLE REDUCTION DRIVES AVAILABLE FOR HORIZONTAL OR VERTICAL MOUNTINGS.

NOW! RATED TO LATEST AGMA STANDARDS

Foote Bros. Worm Gear Drives are rated to the latest AGMA Standards. A new Catalog—HGB—just off the press, illustrates and describes Foote Bros. Worm Gear Drives. Ask your nearby Authorized Foote Bros. Distributor for a copy, or write today.

FOOTE BROS. GEAR AND MACHINE CORPORATION

4583 South Western Boulevard, Chicago 9, Illinois

POWER TRANSMISSION DRIVES

DRILL DEEPLY into Alcoa Alloy 2017 and take a BIG BITE OUT OF PRODUCTION COSTS! Combines Strength with Low Cost!

Turn out stronger parts—at lower cost and in less time—with Alcoa Alloy 2017-T4 or -T451. Faster cutting than steel . . . with less tool wear and longer machine bearing life. Clean, bright finishes easily machined . . . from stock that weighs ⅓ that of brass or steel . . . into parts that require tough, deep drilling operations.

For exceptionally high strength, turn to Alcoa 2024-T4 or -T351. Cuts at high speeds and gives accurate machining detail for such applications as fittings and threaded fasteners. With 2017-T4 or -T451 and 2024-T4 or -T351, chip breakers are recommended.

You get all these advantages with Alcoa® Aluminum Screw Machine Stock Alloys (which also include 2011-T3 or -T8, 6061-T6 or -T651)—and a complete package of technical data and on-the-spot service is available to you . . . when and where you need it! Ask your Alcoa distributor (or nearest Alcoa sales office) for a free copy of the comprehensive *Alcoa Screw Machine Stock Estimating and Operating Data Book*. Put *all* the data right at your finger tips. Ask, too, for a handy *Alcoa Conversion Calculator*, a slide-rule device that quickly computes costs, shows savings in making a switch from brass to aluminum! Aluminum Company of America, 845-E Alcoa Bldg., Pittsburgh 19, Pa.

"PLUS" bonuses — when you use Alcoa Aluminum Screw Machine Stock!

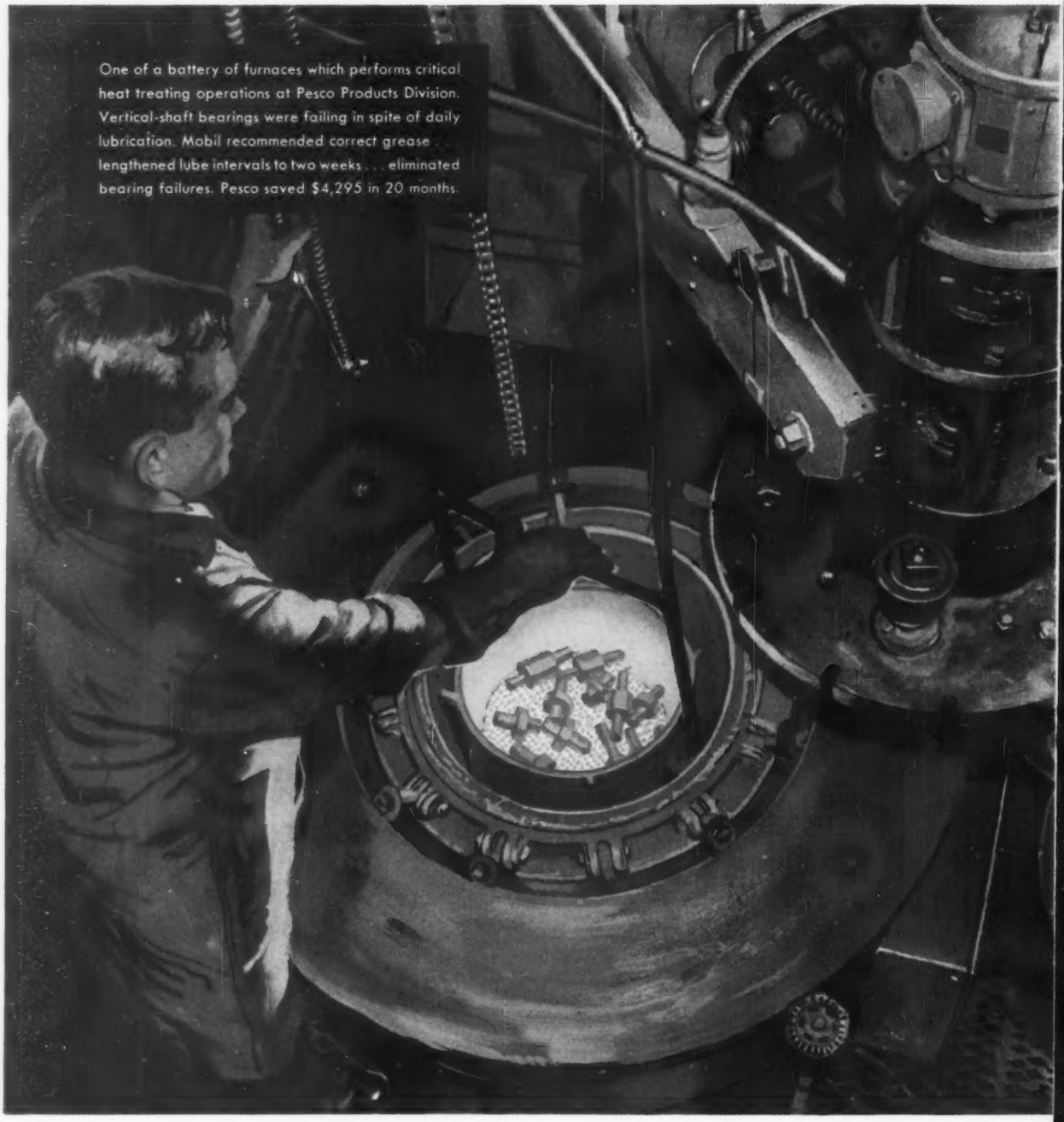
1. Wide range of stock sizes.
2. Guaranteed market for up to 60 per cent of your Alcoa Aluminum turnings and borings.
3. Extensive mill and distributor inventories to cover all requirements.
4. Chamfered ends . . . at no extra cost.
5. Specific 12-ft lengths . . . at no extra cost (rounds up to 2¾ in.; hexagons up to 2 in.).

ALCOA ALUMINUM

SCREW MACHINE STOCK

For exciting drama watch "Alcoa Presents" every Tuesday, ABC-TV, and "Alcoa Theatre" alternate Mondays, NBC-TV

Pesco shows $11,735 saving


One of a battery of furnaces which performs critical heat treating operations at Pesco Products Division. Vertical-shaft bearings were failing in spite of daily lubrication. Mobil recommended correct grease . . . lengthened lube intervals to two weeks . . . eliminated bearing failures. Pesco saved $4,295 in 20 months.

Mobil Correct

with Mobil Program

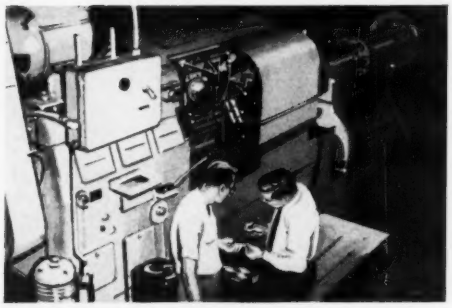
At Borg-Warner Corporation's Pesco Products Division, Mobil helps cut maintenance costs, increase production

Pesco Products ranks with the nation's foremost suppliers of components and systems for aircraft and space-vehicles . . . must maintain exacting product reliability and rigid schedules. To help meet these critical requirements, Pesco turned to a Mobil Program of Correct Lubrication.

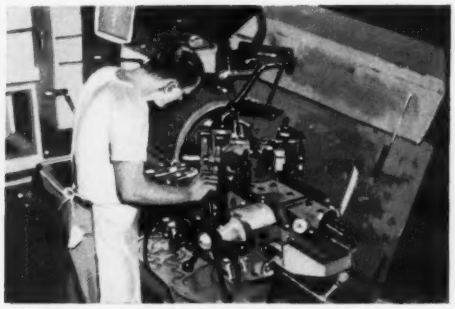
Mobil engineers began a program of analysis and study of Pesco maintenance and lubrication procedures in cooperation with Pesco personnel. The improved methods, schedules, and recommendations that resulted brought Pesco maintenance to a new standard of efficiency and economy. Special areas of assistance by Mobil included instruction of maintenance crews, lubrication charts and recommendations, and problem-solving in high-cost areas. In 20 months, the Mobil Program saved Pesco $11,735.

To find out how a Mobil Program may benefit *your* plant, write for an informative brochure. Or call your local Mobil representative.

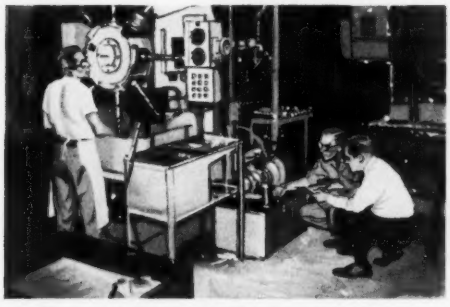
MOBIL OIL COMPANY
150 East 42nd Street, New York 17, N. Y.



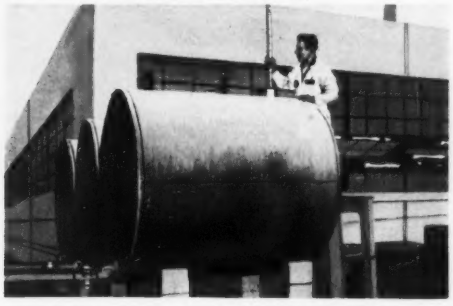
1. Sticking clutch plates on automatic screw machines posed costly maintenance problem for Pesco. Mobil traced the trouble to the oil used for machine lubrication . . . supplied a dual purpose fluid that eliminated the clutch problem, prevented loss of the cutting oil effectiveness as well . . . saved $3,528 in 20 months.



2. In Pesco's chucking department, lathes would not hold tolerance during the warmup because of oil characteristics. Mobil product eliminated the problem . . . saved Pesco $1,072 in lost production time. And on automatic chuckers, a Mobil hydraulic oil ended recurrent pressure losses . . . saved $1,960 in maintenance costs in 20 months.



3. On Pesco's hydraulic machinery, oil deterioration led to sticky valves, erratic operation, machine tool shutdowns. Mobil trained plant personnel in preventive maintenance procedures, recommended proper fluids . . . cut hydraulic maintenance by 40%.

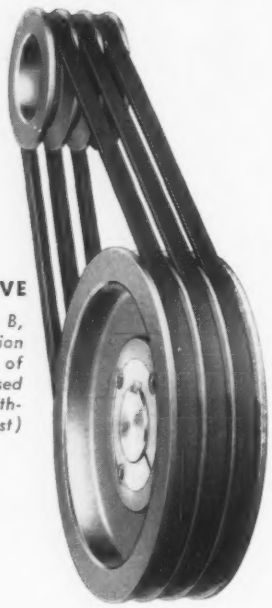


4. Mobil studied Pesco's oil usage patterns . . . recommended bulk storage for certain petroleum products. Bulk delivery differential and reduced handling costs totaled $880 for Pesco Products Division in the first year alone.

Lubrication

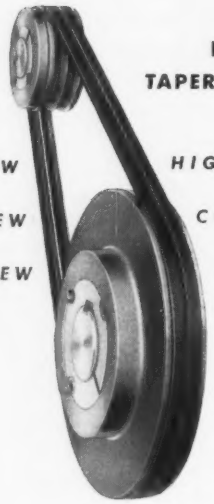
an entirely new line of
V-Belt Drives.....

DODGE Dyna V



BIG-GROOVE TAPER-LOCK DRIVE

(— using standard A, B, C, D and E cross section belts, the hp ratings of which have been increased an average of 40% without any increase in cost)



DYNA-V TAPER-LOCK DRIVE

NEW HIGH CAPACITY

NEW COMPACTNESS

NEW SAVINGS IN COST

COMPARISON, ILLUSTRATED ABOVE — 3 HP, 1750 RPM, 2.41 TO 1 RATIO

	BELTS		SHEAVES			CENTER DISTANCE	HP	WEIGHT (LBS.)	COST	
	Number	Size	O.D. Driver	O.D. Driven	Width				Per hp	Per Drive
BIG-GROOVE TAPER-LOCK DRIVE	3	A42	4.15"	8.95"	2½"	12.3"	4.62	24.7	$5.62	$25.98
DYNA-V TAPER-LOCK DRIVE	2	3V400	3.35"	8.00"	1 3/32"	10.8"	5.0	18.0	$4.50	$22.50
% SAVING *Savings vary with different sized drives*			**19%**	**10%**	**56%**	**12%**	+	**27%**	**19.9%**	**13.4%**

Dyna-V Drives are sensationally compact. They are capable of handling up to three times as much horsepower in a given space. Dyna-V opens vast new possibilities for better, more economical machine design. And, in most instances, *Dyna-V costs less!*

Narrower grooves, to match stronger, narrower Dyna-V Belts, greatly reduce the face width and the weight of Dyna-V Sheaves. Cost is lowered. Smaller diameter sheaves and shorter center distances multiply savings.

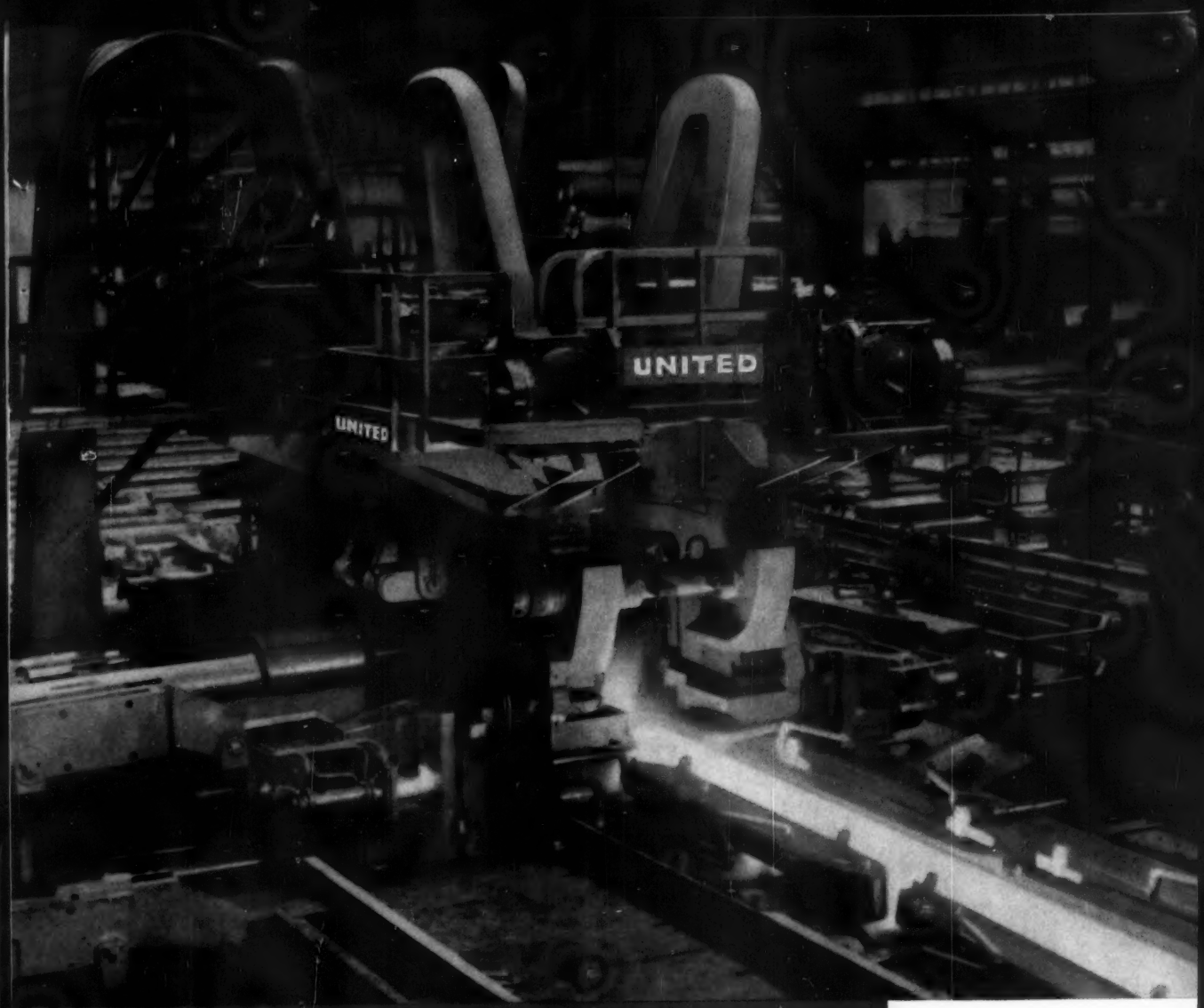
Dyna-V Sheaves decrease shaft overhang—increase bearing life. The new dimensional stability of Dyna-V Belts solves the problem of belt matching. Every belt carries its full share of the load.

Dyna-V Drives are available for capacities from 1 to 1500 hp. Ask your Dodge Distributor. Or write us for new Dyna-V Bulletin.

DODGE MANUFACTURING CORPORATION, 4400 Union St., Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look under "Dodge Transmissioneer" in the *white* pages of your telephone directory, or in the yellow pages under "Power Transmission Machinery".



UNITED

WIDE FLANGE BEAM MILL

UEFCO

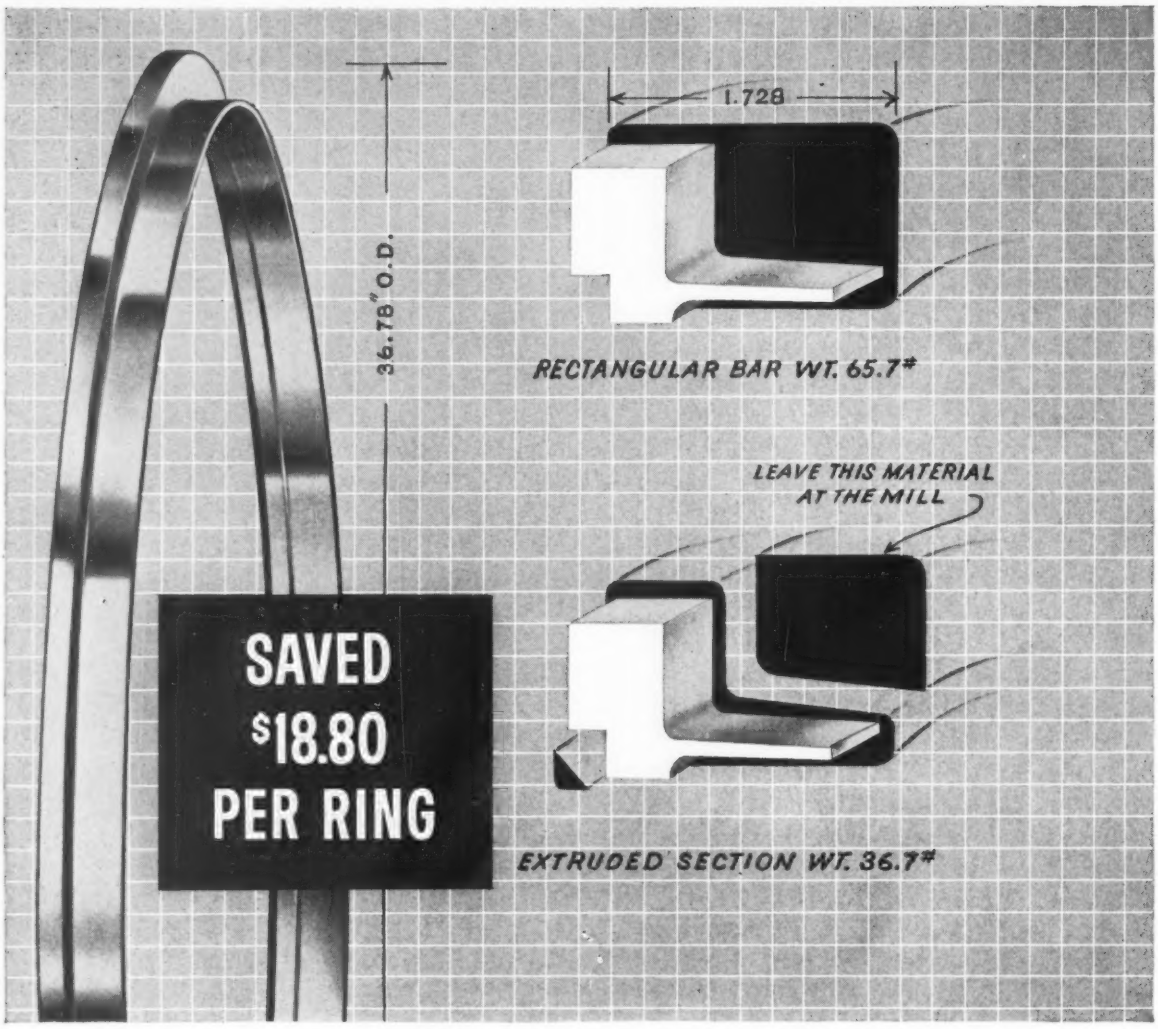
PITTSBURGH, PA.

Plants at Pittsburgh, Vandergrift, Youngstown, Canton, Wilmington

SUBSIDIARIES: Adamson United Company, Akron, Ohio; Stedman Foundry and Machine Co., Inc., Aurora, Indiana

Designers and Builders of Ferrous and Nonferrous Rolling Mills, Mill Rolls, Auxiliary and Coal Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

UNITED ENGINEERING AND FOUNDRY COMPANY



Flash butt-welded rings cut the amount of stainless 321 required by 50%

Using a special extruded section, 29 lbs. of stainless 321 were eliminated —plus the extra hours of expensive machining required to hog it out.

Amweld is equipped to supply flash butt-welded rings and circular products in stainless, titanium, aluminum, as well as a wide variety of corrosion-resistant alloys. If you would like to know more about Amweld's welding, fabricating and complete machining facilities, phone or write.

GET THE FACTS ABOUT AMWELD

New 20-page catalog describes flash butt-welded rings and circular products manufactured by Amweld. Also booklet entitled, "How Flash Butt-Welded Rings are Made."

AMWELD® INDUSTRIAL PRODUCTS

THE AMERICAN WELDING & MFG. CO. • 110 DIETZ ROAD • WARREN, OHIO

How to Maintain Effective Discipline

F. H. Schwarze, umpire staff, General Motors Corp., gave personnel officers meeting at Michigan State University ten guides "every supervisor should bear in mind": 1. Make instructions simple, understandable. 2. Know the rules—shop, safety, conduct. 3. Move in promptly on violations—never overlook one. 4. Get all the facts—to be fair and to justify any needed management action. 5. Give the employee an opportunity to explain. 6. Decide the proper action. 7. Take that action in a fair, firm, reasonable manner. 8. Never lay a hand on the employee. 9. Observe contractual procedures. 10. Keep a record of all the facts.

Banker Challenges New England Industry's Inefficiency

New England industry will lose business if it doesn't step up investment in production equipment, George H. Ellis, vice president, Federal Reserve Bank of Boston, warned a National Industrial Conference Board session. He noted that New England manufacturers have been investing less money per worker in capital facilities than have their national counterparts. He says they must expand their rate of investment by $36 million a year to hike productivity 2 per cent annually.

Realtors Say Money Is Easing

Home buyers are finding that loan money is easier to get than it was three months ago, the National Association of Real Estate Boards declares. For conventional mortgage loans on houses in good neighborhoods, the prevailing interest rate is 6 per cent in half the nation, 6¼ to 6½ in most other areas, NAREB says.

Union Carbide Develops Exhaust Purifier

Union Carbide Corp. says it has developed a new system for purifying auto exhaust gases. The approach combines direct combustion with catalytic oxidation to burn between 80 and 90 per cent of the hydrocarbons and carbon monoxide, the company claims. The device is located to take maximum advantage of engine heat. It employs new special catalysts.

Powder Metal Makers Campaign for New Markets

Look for powder metal manufacturers to become even more aggressive marketers. At the annual meeting of the Metal Powder Industries Federation, the Powder Metallurgy Parts Manufacturers Association became the sixth

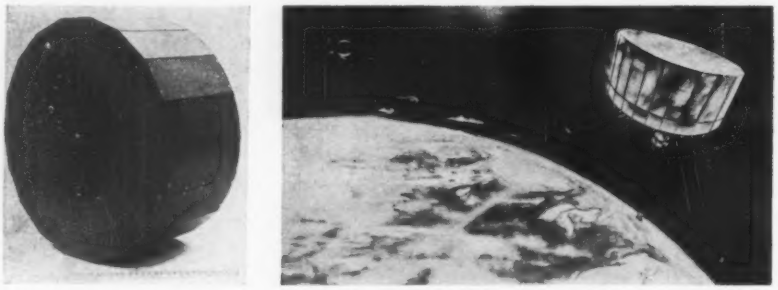
group to join the federation. The partmakers have embarked on a program to make powder metal information more easily available and they're working on standards and specifications. Last year, 35,000 tons of iron powder were used in this way: 54.5 per cent for parts, 36 per cent for welding electrodes and flame cutting, 4.5 per cent for electronic and magnetic applications, 5 per cent for miscellaneous jobs.

Where Aluminum Wrought Products Go

Last Wednesday, the Aluminum Association reported its breakdown of wrought products shipments by market classifications for 1959:

Market class	2nd Half 1959	1st Half 1959	Market class	2nd Half 1959	1st Half 1959
Building products	23.3%	21.5%	Containers & packaging	9.7%	8.3%
Consumer durable goods	8.6	11.1	Conversion	7.9	10.1
Transportation	13.4	14.1	Distributors & jobbers	19.2	17.8
Electrical	9.2	9.2	Exports	1.6	0.6
Nonelectrical machinery	3.6	4.0	Other	2.5	3.3

Fabricating the Tiros Weather Satellite



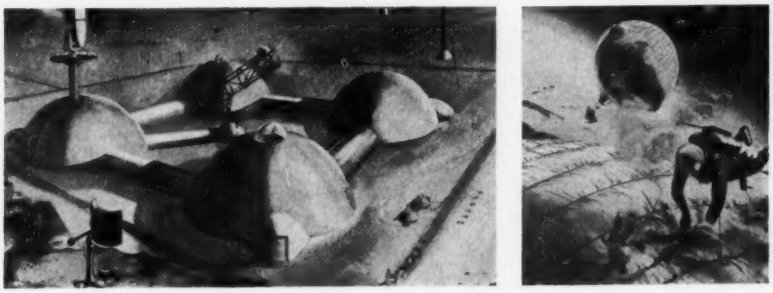
The drum at left carries all active components of the Tiros weather satellite now circling the earth every 99.15 minutes at 450 miles in space (see sketch at right). The drum's top and sides are covered with more than 9000 solar cells which generate electricity directly from sunlight to charge storage batteries used to power internal electronic equipment—TV cameras, video tape recorders, transmitters, power sources, and complex control and communications equipment. The 42 in. in diameter cylinder is made of aluminum alloy, formed sheet and extrusions riveted together. The base plate and top plate are reinforced with radial and circular ribs, joined by extruded aluminum T-sections, which serve as a frame for the 18 removable side panels. Radio Corp. of America designed and constructed the satellite.

How Aluminum Producers View 'Price Squeeze'

Reynolds Metals Co., appearing before the House Basic Metals Subcommittee (see Page 102), firmly denied the existence of any price squeeze by the primary producers against fabricators. Joseph H. McConnell, Reynolds' executive vice president and general counsel, feels that extrusion prices are determined by the independents. "It is fairly safe to assume that if the price of pig were reduced, the independents themselves would lower the prices of extrusions."

Lewis P. Favorite, vice president, Aluminum Co. of America, had a different view: "We do not deny, and in fact assert, that the spread between the price of the raw material and the price of finished soft alloy extruded products is too narrow. The cause, however, does not lie with Alcoa; rather, Alcoa is a victim of the situation . . . Alcoa has no recourse but to sell its finished extrusions on a competitive basis."

Boeing Unveils Space Vehicle Concept



The drawings above helped Wellwood E. Beall, senior vice president, Boeing Airplane Co., Seattle, explain his concept of an interplanetary exploratory vehicle to a Society of Automotive Engineers meeting last month. At left is a sketch of a moon colony; at right, an astronaut constructs a rubber space capsule in geo-orbital position.

Are Athletes Good Salesmen?

"Not as good as they're cracked up to be," asserts Howard R. Conant, president, Interstate Steel Co. He has consistently employed top grid stars as steel salesmen, says: "As salesmen, some of them have proved good football players." He says a star's name "may open a few doors for him, but he has to sell after the door's open. No one will buy a product or service from a star if it is not good business. It depends on the athlete's personality and his knowledge of the business and the product." Mr. Conant annually invites his Chicago area customers and all available members of the Chicago Bears to a party and shows filmed highlights of Bear games.

Electric Power Capacity Climbs; Big Atomic Plant Planned

Generating capacity of the U. S. electric power industry will reach 170.5 million kilowatts by yearend and 203 million kw by 1963, estimates Cleveland Electric Illuminating Co. The firm expects nationwide output to reach 1 trillion kw-hr by the end of 1963. Southern California Edison Co. has sent a letter of intent (to Westinghouse Electric Corp. and Bechtel Corp.) to negotiate contracts for design and construction of a 36,000 kw atomic powerplant. The $70 million facility would require about four years to build, produce 360,000 kilowatts.

Sloppy Marketing Holds Back Our Exports

The University of Michigan's Dr. Laurence P. Dowd says U. S. industry can blame its export losses on poor marketing practices more than on high wages

and prices. He says too few firms undertake real advertising and sales promotion programs abroad. Nor do they train foreign salesmen well enough. He also blasts U. S. businessmen's failure to maintain adequate stocks abroad to serve customers quickly. He adds that the U. S. suffers a handicap in high taxes and high raw material prices. And he points out that we are losing our traditional advantage of efficient plants and management.

Straws in the Wind

Hughes Aircraft Co.'s ground systems group will hire 600 engineers and scientists during the next nine months . . . Domestic car sales during the middle ten days of April were the highest for any "middle ten" period since 1955; projections of May production show a 12 per cent jump over April output for the highest May total since 1955 . . . Reynolds Metals Co. has introduced a new, lower cost, line of 20 colored aluminum building products . . . David J. McDonald, USW president, and R. Conrad Cooper, executive vice president-personnel services, U. S. Steel, will co-chair the Human Relations Research Committee and represent their respective parties on the Local Working Conditions Committete, whose neutral chairman has not been announced . . . March new business incorporations rose 18.9 per cent from the February level but fell 4.1 per cent short of the March, 1959, pace . . . The third foreign ship into Cleveland this season—the Norwegian *Saguenay*—dropped 500 tons of French wire rods in the city . . . Gordon H. Wolfe, eastern vice president, Nationwide Leasing Co., predicts that $50 million worth of equipment manufactured by metalworking companies will be leased this year—42 per cent more than last year's total.

USW Gets Pension Guarantees for Job Hoppers

The United Steelworkers of America has negotiated a "portable" pension plan with 19 Vancouver, B. C., metalworking companies. Under it, a worker will be able to "circulate" among the companies without losing pension benefits of at least $16.25 a month. Since the companies are contract manufacturers, it's common for workers to jump to whichever firm has a current contract. The plan will cost each employer 5 cents per manhour, each employee the same.

Metalworking Pulse

The Business Trend: Further cutbacks in the steel industry and strike-hampered auto production were too great to overcome the rise in rail freight carloadings. Result: Another 1 point drop in STEEL's production index. **Autos:** Walkouts at assembly and supplier plants cut output late in April, but a return to the 145,000 unit level was anticipated last week. May schedules have been upped slightly. **Steel:** Operations continued the downtrend that started at the end of January.

• INDUSTRIAL PRODUCTION

Week ended Apr. 30 .... **163†**
Year ago **167**
Details on Page 115

• PASSENGER CAR PRODUCTION

Week ended May 7 .. **145,000***
Year ago **134,763**
Details on Page 112

• INGOT PRODUCTION RATE

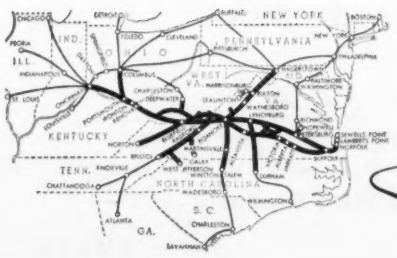
Week ended May 8 .. **74.8%†**
Week ago **77.6%**
Details on Page 186

†Preliminary. *Estimated.

The New N&W . . .

NATION'S GOING-EST RAILROAD!

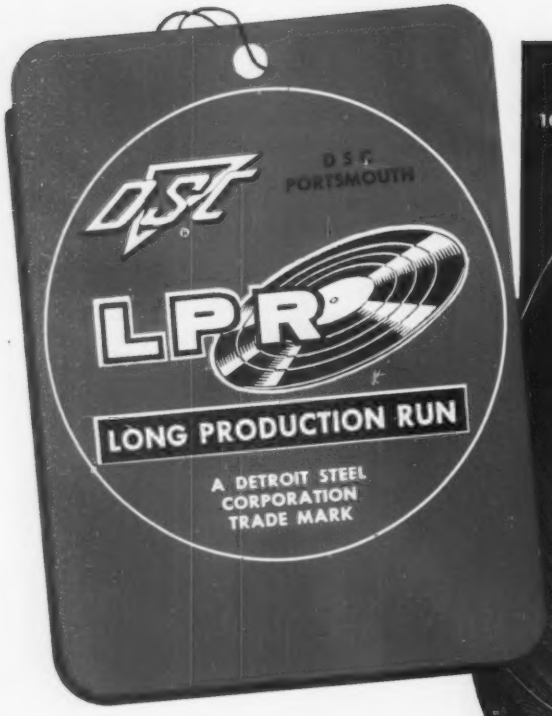
- America's newest fleet of diesel locomotives . . . 529 units with average age only 2.5 years.
- 81,006 modern freight cars — more per mile of line than any other major U. S. railroad.
- Busiest large railroad . . . greatest freight traffic density.
- A 30% longer railroad with merger of the Virginian into Norfolk and Western. *Wonderful new industrial sites.*
- New, easier grades, more interchange points with other railroads.
- Now a billion dollars in assets.

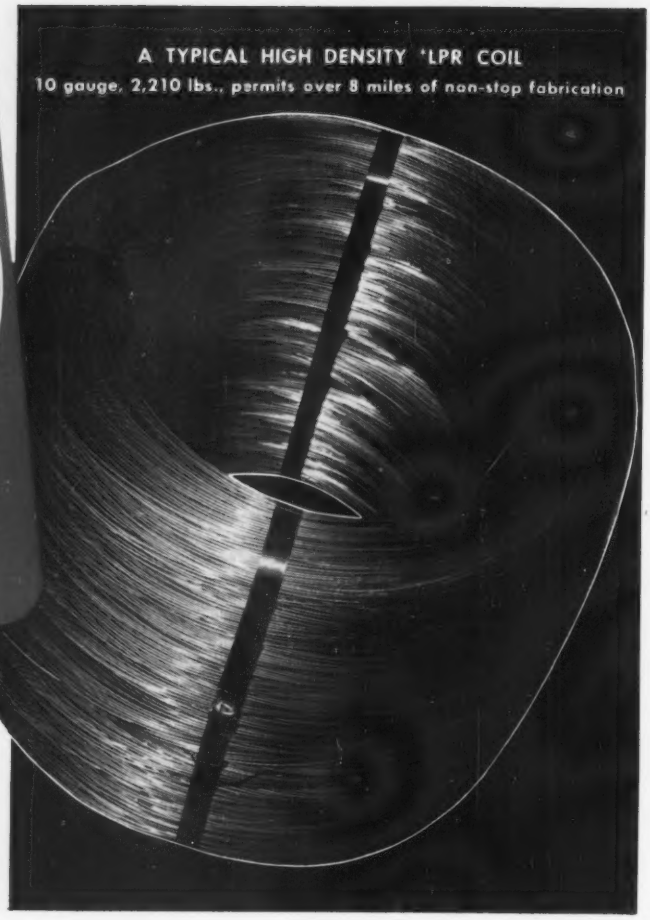


This is why the dynamic, new Norfolk and Western means savings in time and money to shippers!

Norfolk and Western Railway

GENERAL OFFICES • ROANOKE, VIRGINIA





Still using brite wire in traditional mill-weight bundles?

Look at these *LPR savings that can be yours:

- **avoid up to 95% of your work stoppages due to coil changes and set-up adjustments.**
- **reduce your coil-remnant scrap to the vanishing point.**
- **cut your unloading time alone by 15 to 50%.**
- **lower your manhour costs up to 20%.**
- **release from 15 to 20% of your coil storage area for productive uses.**
- **step up your fabricating capacity by 33⅓%, without additional manpower or capital investment.**
- *These savings and improvements were reported by *LPR users following switch from 150-400 pound traditional bundles.*

Says an enthusiastic LPR user—

"Using old fashioned mill bundles is like wasting time and effort sticking seven 1¢ stamps on every airmail letter when one 7¢ stamp will do the trick!"

For more information about *LPR's or other DSC products, please call your nearest DSC Customer "Rep" or write DETROIT STEEL CORPORATION, BOX 4308, DETROIT 9, MICHIGAN

Customer "REP" Offices in Principal Cities

*A DSC TRADE MARK

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Performance Proved DSC

DETROIT STEEL

Flat Rolled and Wire Products

Automation:

A New Foreign Threat

We recently arrived at the office of a leading builder of automation control equipment at the same time as a group of foreign visitors.

They were engineers (not casual visitors) here to learn about the function and application of control systems their companies had purchased from the U. S. firm.

In digging deeper, we found that more than 50 per cent of the U. S. company's orders for automation control equipment were from foreign countries.

Despite the advantages of lower wage costs outside the U. S., ranging from basic steel to finished products, manufacturers in foreign countries are applying high production equipment and automation systems wherever they can.

They have good reasons for doing so.

Over the long term, it's inevitable that their wage costs will rise. But, more importantly, they will have ready access to large, free, home markets when present artificial tariff and quota restrictions are removed.

The Common Market (France, Germany, the Netherlands, Italy, Belgium, and Luxembourg) has a population of 168 million and an annual trade of nearly $50 billion.

The Outer Seven Group (England, Norway, Sweden, Denmark, Switzerland, Portugal, and Austria) has a population of 89 million and a trade of $36 billion.

Since foreign producers have marketing areas comparable to our own, they can justify the application of mass production techniques.

Lower cost methods will result in competitive advantages in domestic and export markets—including the U. S.

In this country, some companies are going all the way in applying automation, such as tying in electronic order handling with production controls.

Mostly, we have "islands of automation" applied only partially to a production line, process, or machine.

That's not enough.

With the world industrial picture changing so rapidly, U. S. industry needs to find out where it can use automation, whether it involves fancy closed-loop systems or relatively simple tape setups for single machines.

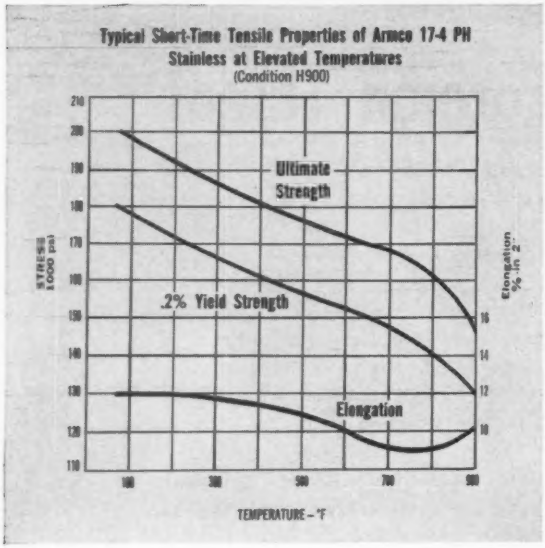
Above all, we shouldn't sit by and watch our foreign competition gain a bigger advantage than they already have.

Automation will pay off, not only in reduced labor costs, but in better utilization of materials and a higher quality end product.

Irwin H. Such
EDITOR-IN-CHIEF

ARMCO STEELS / for better products • lower costs

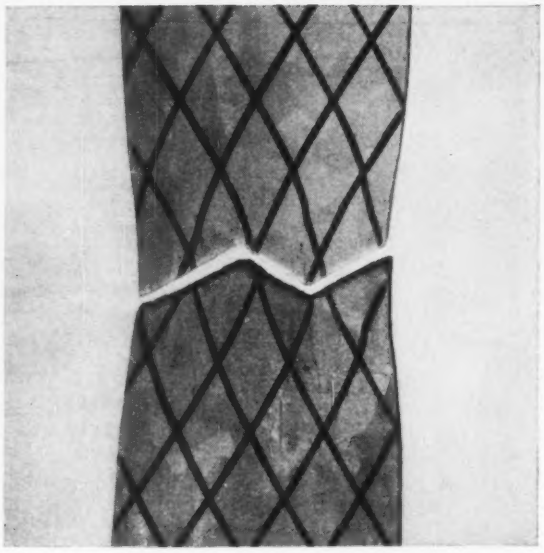
Here's Why These Armco Can Help You Reduce Costs,



Armco 17-4 PH Stainless Steel Bars

Take a close look at the typical mechanical properties of this Armco precipitation-hardening stainless steel. The combination of excellent corrosion resistance, comparable to that of Type 302 stainless, and high hardness and strength up to 900 F, offers an economical solution to many problems.

Armco 17-4 PH is being widely used by manufacturers of fasteners, pumps and valves, chemical and food processing equipment and a wide range of specialty products. An added advantage: Armco 17-4 PH Stainless is hardened at only 900 F. This one-hour heat treatment eliminates descaling, straightening and finishing operations.



Armco ZINCGRIP® Steel

Fractured tensile test specimen of Armco ZINCGRIP® Steel is cross-hatched to show metal flow. It demonstrates that the full weight hot-dip zinc coating won't flake or peel even when the metal is stretched 60-70% and broken.

This means you can give your products economical overall protection against rusting. There's no need to worry about flaking or peeling of the zinc coating, no matter how severe the forming operations. For only a few cents' premium over cold-rolled steel, you can often eliminate the cost of painting or plating parts. Used for more than 20 years, Armco ZINCGRIP Steel has shown it can cut costs and improve performance. Supplied in sheets and coils.

ARMCO STEEL CORPORATION
1580 Curtis Street, Middletown, Ohio

Please send me information on
- ☐ Armco 17-4 PH Stainless Steel
- ☐ Armco ZINCGRIP Steel
- ☐ Armco ALUMINIZED Type 1
- ☐ Armco ALUMINIZED Type 2

Name_____
Company_____
Street_____
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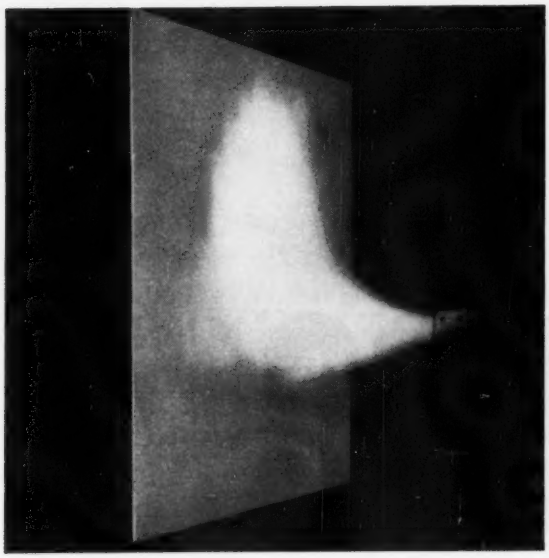
Perhaps these special Armco Steels can help you counteract the effects of rising labor costs and mounting competition. Let us send you complete information so you can evaluate their full potential for your products. Just fill out and mail the coupon.

New steels are born at Armco

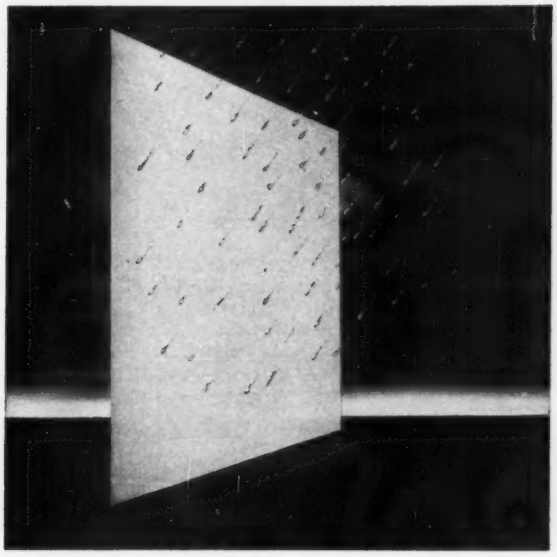
Special Steels Improve Product Design



Armco ALUMINIZED STEEL Type 1

The extraordinary ability of Armco ALUMINIZED STEEL Type 1 to resist heat and a combination of heat and corrosion may help you. This Armco-developed special steel combines the strength of a steel base with a hot-dip aluminum coating that provides good heat reflectivity, as well as resistance to oxidation and corrosion. No other metal in its price class offers the advantages of ALUMINIZED STEEL Type 1.

It is unmatched in economical durability for gas- and oil-fired heat exchangers and combustion chambers, automobile and truck mufflers, drying ovens, appliance parts, and similar applications.



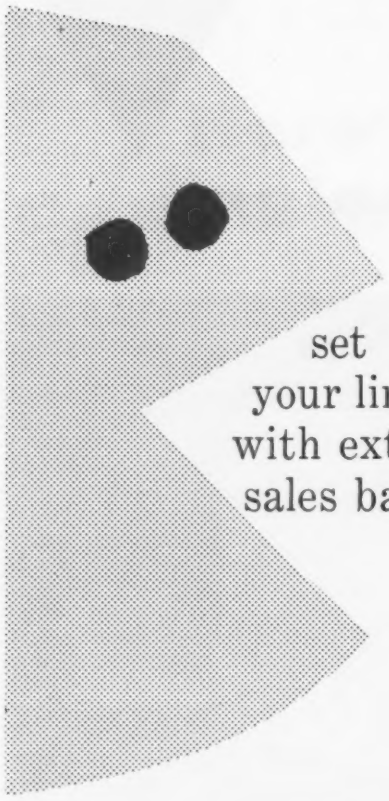
Armco ALUMINIZED STEEL Type 2

Outstanding advantages of this special Armco Steel are its lasting protection against atmospheric corrosion and its low cost. The unique hot-dip aluminum coating provides lasting rust-resistance; the steel base assures adequate strength and rigidity. Corrosion tests and service prove that the coating on Type 2 ALUMINIZED STEEL sheets outlasts unpainted galvanized sheet coatings by at least 3 to 1.

For siding, equipment covers, sheathing, ventilators, roof decking, agricultural equipment and other products exposed to the atmosphere, this special Armco Steel assures long service life at minimum cost. ALUMINIZED STEEL Type 2 is available in sheet and strip in a wide range of gages.

ARMCO STEEL

Armco Division • Sheffield Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation



• specify • specify

set your line with extra sales bait

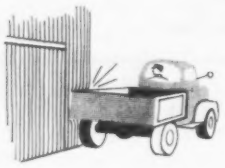
TI-CO® NON-FLAKING GALVANIZED SHEETS

for DURABILITY

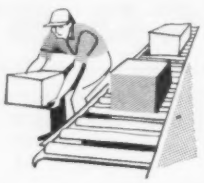
Tough, strong, corrosion-resistant . . . that's Inland TI-CO . . . the non-flaking galvanized sheet with the rugged coating plus the inherent strength of steel. ■ Easy formability, too. Deep-draw, spin, punch, crimp, Pittsburgh lock-seam—work TI-CO to the very limit of the base metal—and you'll never have a chipping, peeling, cracking or flaking problem. ■ That's why manufacturers of products calling for endurance under roughest treatment—buildings, conveyors, chutes, siding, highway guard rails—use TI-CO to add "sales bait" to their product line.

INLAND STEEL COMPANY 30 West Monroe Street · Chicago 3, Illinois Sales Offices: *Chicago · Davenport · Detroit*
Houston · Indianapolis · Kansas City · Milwaukee · New York · St. Louis · St. Paul

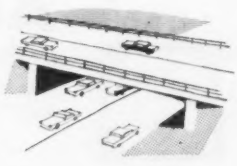
INLAND



Farm buildings made from non-flaking TI-CO maintain corrosion-resisting coating under toughest abuse.



Though subjected to constant abrasive action, TI-CO adds years of service to this roller conveyor.



Denting, scratching, weathering won't stop the protection of highway guard rails afforded by TI-CO.

'Our Business Is Good, But . . .'

This week, STEEL's air safari checked the business pulse in the lower Great Lakes states. Last week, our editors found that metalworking sales in the Eastern states were holding well to first quarter levels.

ABOUT eight out of ten metalworking executives in the lower Great Lakes region tell STEEL: "Business is better than last year's, but it's not as high as we expected."

The other two aren't too pessimistic. They are likely in an inventory squeeze, and they don't see much of an upturn until later this year.

Getting more specific about this quarter: There is a closer split between optimism and uncertainty (not to be confused with dark pessimism) in this key metalworking area.

• **Antidote**—Andrew M. Kennedy Jr., vice president-purchases and traffic, Westinghouse Electric Corp., sums up the feelings of many when he declares: "I'm concerned about the pessimism in the economy. I think it stems from a less sustained rate of inventory building than some expected, unusually bad weather in March, and the moderating effect of the long steel strike. We're in a solid year but not a boom period."

Some agree with Col. Willard F. Rockwell, chairman, Rockwell Mfg. Co. and Rockwell-Standard Corp., Pittsburgh. He states: "It is not the near term outlook that bothers us but the longer term threat of low wage imports. Our domestic economy is in great danger unless we can find ways to reduce our manufacturing costs—particularly the excessive government expenditures which have increased our tax to the highest point ever known."

Industry by industry, here is what the editors found out:

• **Capital Goods**—While manufacturers of machine tools are far from satisfied with the general level of new orders, most agree with Louis Polk Sr., president of Sheffield Corp., Dayton, Ohio, who says: "When-

ARMCO STEEL CORP.'s president, Logan T. Johnston, tells STEEL's Associate Editor Bob Jaynes that construction will take up the slack in steel demand when model changeover cuts automotive demand

DETROIT—Paul W. Robson, Wolverine Tube Div., Calumet & Hecla Inc.: "Orders are up slightly for May over April"

PITTSBURGH—W. G. Blessing, Blaw-Knox Co.: "Steel production will decline a little more before it levels off"

PITTSBURGH—Col. Willard F. Rockwell (left), Rockwell Mfg. Co., tells Editor Walter Campbell: "The first quarter was extremely satisfactory"

DETROIT—James M. Roche, Cadillac Div., General Motors Corp.: "The current spring surge being experienced by all manufacturers indicates that a 6.9 million car year is a real possibility"

CINCINNATI AIRPORT — Edward Granger (right), F. C. Phillips Inc., Stoughton, Mass., screw machine product maker: "Our proprietary line of athletic shoe hardware is doing well"

CINCINNATI — Thomas Kling (left), Lodge & Shipley Co., and Edward Rowekamp (center), Climax Products Div., show STEEL's representative division's bottle unloading machine

ever the industry has a new order level for cutting tools of over $500 million, as it does now, there is a sound basis for business."

Roland Lehr, president, Baker Bros., Toledo, Ohio, reports that appliance makers and electrical component manufacturers are among the most active customers today. Thomas Kling, vice president, Lodge & Shipley Co., Cincinnati, looks for better orders this quarter than last, although he says the third quarter "scares us." The fourth quarter should be better, which goes along with industry thinking that The Machine Tool Exposition—1960 will stimulate ordering.

O. C. Underhill, assistant president of Ohio Knife Co., Cincinnati, which supplies machine tool builders, declares that his firm has had a steady sales rise since June, 1958, but that he is expecting a leveling off this half. The second half will show a gradual rise.

Among other capital goods makers, the feeling is that things are just about on schedule if the government's estimate of $37 billion for plant and equipment spending is to be reached. Robert Potter, president of E. W. Bliss Co., Canton, Ohio, likens his company's business to that of the 1955-57 period. Surface Combustion Div. of Midland-Ross Corp., Toledo, reports a lag so far in its projections but expects the year to end up about level with 1959.

• **Electrical Equipment**—Officials in this industry are confident about the 1960 outlook. As John S. Roscoe, executive vice president of Lincoln Electric Co., Cleveland, declares: "This will be a good year if we make it one. The heat's on the sales department." After reporting the two biggest order months in history, Edward E. Helm, president of Reliance Electric & Engineering Co., Cleveland, smiles: "We're feeling pretty optimistic."

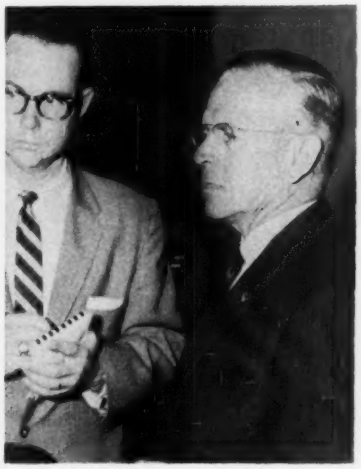
Clark Controller Co.'s marketing vice president, E. R. Jung, reports his firm's shipments in the first quarter were 30 per cent ahead of year ago levels. Bookings are about equal to last year's pace.

CLEVELAND—Douglas D. Brien, Ohio Gear Co., looks for the year to be about equal to 1959 but 20 to 30 per cent under record 1956

AKRON — James C. Richards, B. F. Goodrich Industrial Products Co.: "Second quarter will be about equal to a good first quarter"

CLEVELAND—E. R. Jung, Clark Controller Co.: "Capital spending by the steel industry has helped pick things up for us"

CLEVELAND—Edward E. Helm, Reliance Electric & Engineering Co.: "We're putting more emphasis on new products and new areas of interest for the company"



DAYTON, OHIO—Louis Polk Sr., Sheffield Corp.: "New orders are soft in second quarter, but we look for a pick-up in the second half"

CLEVELAND—F. R. Widmer (left) Republic Steel Corp., tells Assistant Editor Derry Eynon: "If consumers should actually reduce inventories, shortages will appear rapidly"

• **Steel**—Republic Steel Corp.'s F. R. Widmer, director of commercial research, believes that "we are using steel as rapidly as in any boom year." But customers are reducing the rate of inventory accumulation, relying on faster deliveries from the mills. Logan R. Johnston, president of Armco Steel Corp., Middletown, Ohio, is still counting on a "120-million-ingot-ton year."

• **Components**—Suppliers of parts say they're experiencing an inventory squeeze, but they anticipate an upturn later this year which will push 1960 ahead of 1959. Paul Reeves, vice president-sales, Timken Roller Bearing Co., Canton, believes that an early introduction of 1961 auto models will signal an upturn in the third quarter which will make up for a sluggish second quarter. James C. Richards, vice president-sales of B. F. Goodrich Industrial Products Co. Div. of B. F. Goodrich Co., Akron, says replacement sales of rubber products are good, but weakness is showing up in autos and some appliance lines.

• **Consumer Products**—Both autos and appliances are on their way to topnotch years. Herman Lehman, general manager of Frigidaire Div. of General Motors Corp., Dayton, reports: "Orders in the last ten days show a good upturn."

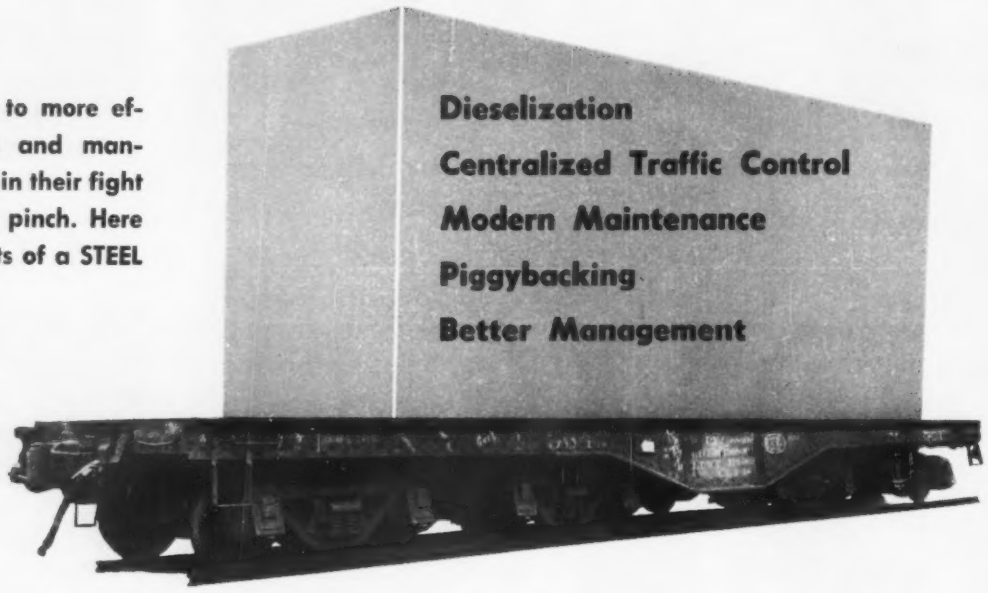
• **Foundries**—While some founders are reporting slack business, Floyd Brown, manager-merchandising, Unitcast Co., Toledo, says that "outstanding quotations and work pending give us a bright outlook."

• **Elsewhere**—Donald A. Campbell, vice president of Ducros Co., Cleveland, a manufacturer's representative, expects substantial increases this year in sales of metal containers, which he considers a good economic indicator. They indicate shipping volume.

Next week, STEEL's editors will visit Chicago - Midwest area metalworking executives.

How the Railroads Help Themselves

They are moving to more efficient operations and management methods in their fight against the profit pinch. Here are the high points of a STEEL survey



THE RAILROADS have problems (taxation, diversification, labor, subsidies to competing carriers, and federal regulation, see STEEL, May 2, p. 36), but they're fighting back.

The most far-reaching developments have been the switch from steam to diesel power and the rise of piggybacking. In 1946, diesels accounted for less than 10 per cent of the gross ton miles of freight hauled by Class I railroads. Today, they haul nearly all tonnage. A diesel can pull 150 cars twice as fast as a steam engine could pull 50 to 60 cars. They cause less rail wear and have a better frequency-of-repair record. The Chesapeake & Ohio reports that its diesel fuel and repair costs last year were at least $25 million lower than those for a comparable steam fleet.

On a year-to-year basis, piggybacking was up about 50 per cent in 1959. (Loadings: 415,000 cars and 580,000 trailers.) The increase for all forms of railroad freight loadings was only 2 per cent. Piggyback loadings in the first 14 weeks of this year were 43.5 per cent over those in the same period of 1959. An industry official thinks piggybacking will ultimately account for one-third of all loadings.

• **Rolling Stock Changes** — Freight cars are being made with 70 ton capacities—cars being retired accommodate 50 tons. Covered hoppers have increased the utility and acceptance of hopper cars. Aluminum usage is expected to boost bulk car payloads. Standardized designs offer construction and maintenance economies and include special damage prevention equipment.

Railroads realize the tremendous cost reduction potential of better scheduling and equipment deployment. (It costs $50,000 or more annually for an engine and crew.) Much work has been done in this area. Since World War II, railroads have combined radar, television, electronic computers, and telephones with electronic controls to expedite car movement and cut deadhead time, thus improving service and incurring economies in yard and main line operations. It formerly took 24 hours for the Pittsburgh & Lake Erie to move cars through its Youngstown yard — more than double the time required in its push-button yard. Centralized traffic control also permits one track to do the work of the three needed before automated operations were started. C&O's Car Location Information Center provides up-to-the-minute information on all car locations.

Electronic yards are being constructed with assembly line methods: Switch and crossover tracks are being prefabricated in sections and transported intact for quick, easy installation. Retired tracks are lifted in sections and installed complete in a new yard or industrial siding, chopping track laying costs from $2.85 to 75 cents a foot. Welded rail cuts track maintenance expense.

Repair shops have been modernized, and many roads, such as the Illinois Central, have instigated extensive component rehabilitation programs. Example: A worn axle may be hammered flat and made into another part. The Nickel Plate's diesel shop returns an overhauled locomotive to service in 2½ days.

• **Atom Harnessed** — Piston rings made radioactive in a nuclear reactor are testing lubricants, permitting measurement of years of wear

in a few hours. The New York Central's Research Laboratory, Cleveland, has developed a nuclear tie tester that ends guesswork.

The NYC also put a snow blower, made from B-36 jet bomber engines, into service this winter. It will clean three tracks at once, reducing the snow fighting bill by "many thousands of dollars" annually. The railroads are testing prestressed concrete ties. A freight car scale using gamma rays can weigh cars moving 30 mph. New trackwork equipment, such as an arc welding unit for building up rail ends, cuts costs.

The rails are seeking new business through faster trains, improved scheduling, and new methods and pricing. Dramatic example: A cushioning device for shipping missiles cuts air freight charges by two-thirds. Lines like the Southern are vigorously aiding industrial development in their service regions.

• **Management Bettered** — Training programs and performance standards for management personnel are being accelerated. More attention is being paid to college recruiting. Paperwork and billing procedures are being improved. C&O uses Univac for payroll and report work. Responsibility accounting, which keeps labor and material expenses pinpointed by areas of responsibility, is growing. Inventories are more closely controlled. There's also a trend to decentralization of responsibility. Mergers and diversification methods are being studied.

Many roads have turned to management consulting firms to help improve service and battle higher costs. Peat, Marwick, Mitchell & Co., for example, an international accounting firm with an extensive management consulting activity, has a full time staff devoted to helping carriers improve many facets of their business, from operating procedures to management methods.

Some sources say the railroads have been slow to meet the needs of the changing times, both in operations and management areas, and that they have been responsible, in part, for some of their present problems. But any way you look at it, it appears that those who may have been asleep at the switch are waking up. And the industry as a whole is making progress in its fight for business and search for improved methods.

First Quarter Earnings Ride High

(Net income)

	1960	1959
Allis-Chalmers Mfg. Co.	$2,645,273	(a)$3,623,466
Aluminum Co. of America	12,635,046	10,725,430
American Machine & Foundry Co.	6,463,000	5,099,000
American Steel Foundries	2,019,012	1,678,645
Blaw-Knox Co.	1,613,000	2,175,000
Bliss & Laughlin Inc.	806,533	772,051
Borg-Warner Corp.	8,319,000	7,770,000
Bridgeport Brass Co.	1,093,251	2,154,638
Budd Co.	2,890,000	4,214,000
Buffalo Forge Co.	220,983	195,296
Caterpillar Tractor Co.	8,860,786	10,981,023
Continental Can Co. Inc.	3,790,000	6,046,000
Electric Autolite Co.	2,285,420	1,968,583
Fansteel Metallurgical Corp.	682,594	641,203
Federal-Mogul-Bower Bearing Inc.	2,467,000	2,966,000
Ferro Corp.	923,000	785,000
Ford Motor Co.	143,100,000	134,800,000
General Bronze Corp.	138,697	271,928
General Electric Co.	52,614,000	52,778,000
General Motors Corp.	323,625,516	293,482,419
General Telephone & Electronics Corp.	18,102,000	15,879,000
Hupp Corp.	507,000	320,000
IBM Corp.	35,178,509	28,964,684
International Harvester Co.	14,018,000	3,606,000
Kaiser Aluminum & Chemical Corp.	7,297,000	4,206,000
Kennecott Copper Corp.	18,201,372	22,396,392
Koppers Co. Inc.	1,773,000	1,147,000
McNeil Machine & Engineering Co.	1,140,991	689,744
Metal & Thermit Corp.	274,191	260,185
Minneapolis-Honeywell Regulator Co.	6,161,293	5,946,784
National Lead Co.	12,071,897	11,745,684
North American Aviation Inc.	5,634,000	7,339,000
Olin Mathieson Chemical Corp.	8,567,000	6,395,000
Otis Elevator Co.	6,120,000	4,024,000
Parker-Hannifin Corp.	553,960	653,275
Phelps Dodge Corp.	4,750,000	13,107,000
Pittsburgh Forgings Co.	647,979	62,524
Porter (H. K.) Company Inc.	1,269,803	1,701,924
Raytheon Co.	2,160,000	2,512,000
Revere Copper & Brass Inc.	2,196,116	2,491,375
Reynolds Metals Co.	6,050,000	9,378,000
Rheem Mfg. Co.	233,417	343,605
Robertshaw-Fulton Controls Co.	866,726	1,436,743
Rockwell-Standard Corp.	5,205,249	4,825,289
Signode Steel Strapping Co.	1,272,188	1,085,162
Square D Co.	2,817,112	1,426,905
Standard Products Co.	546,997	334,776
Texas Instruments Inc.	3,930,000	2,983,000
Thompson Ramo Wooldridge Inc.	2,362,279	2,284,391
Udylite Corp.	337,000	249,253
Union Carbide Corp.	42,091,000	41,581,000
United-Carr Fastener Corp.	1,093,357	1,012,579
United Shoe Machinery Corp.	3,204,623	3,279,617
Westinghouse Air Brake Co.	2,008,417	1,985,814
Westinghouse Electric Corp.	19,496,000	14,409,000
Worthington Corp.	1,780,170	1,767,966

Steelmaker Earnings Climb

(Net income)

	1960	1959
Acme Steel Co.	$1,988,303	$1,849,305
Alan Wood Steel Co.	854,995	955,264
Armco Steel Corp.	23,957,994	21,152,038
Bethlehem Steel Corp.	51,828,727	49,567,301
Colorado Fuel & Iron Corp.	2,846,692	4,604,840
Continental Steel Corp.	1,135,414	1,081,030
Copperweld Steel Co.	1,389,174	1,501,255
Crucible Steel Co. of America	2,724,798	3,511,206
Detroit Steel Corp.	3,501,088	2,568,313
Eastern Stainless Steel Corp.	779,335	679,219
Granite City Steel Co.	4,320,655	3,484,763
Inland Steel Co.	18,743,934	17,859,090
Jones & Laughlin Steel Corp.	17,794,000	15,738,000
Kaiser Steel Corp.	6,687,000	3,303,000
Lone Star Steel Co.	2,484,095	2,021,876
Lukens Steel Co.	2,314,442	1,008,394
McLouth Steel Corp.	5,826,974	4,912,028
National Steel Corp.	17,718,342	16,504,090
Republic Steel Corp.	28,239,545	26,844,585
U. S. Steel Corp.	112,578,752	106,585,303
Universal-Cyclops Steel Corp.	2,085,994	2,080,492
Vanadium-Alloys Steel Co.	1,884,665	1,153,902
Washington Steel Corp.	737,642	692,174
Wheeling Steel Corp.	5,547,000	4,471,000
Youngstown Sheet & Tube Co.	12,891,248	11,451,864

What Investment Firms Look For

A. Initial Evaluation

1. Technical and economic areas of operation.
2. Competitive position.
3. Present market; potential.
4. Management's capability.
5. Capital required for accelerated growth.
6. Company's ability to convert invested capital into profit.
7. Potential public market value of the firm's stock.

B. Preliminary Negotiations Before Investing

1. Present sound book value, with consideration for intangible assets.
2. Management incentives, like stock options, profit sharing, estate tax planning, and pension plans.
3. Terms of convertible debenture.
4. Management aids needed from the SBIC.

Source: Electronics Capital Corp.

Small Firms Can Get Funds

SINCE Congress passed the Small Business Investment Act in 1958, more than 90 Small Business Investment Corporations (SBIC) have been established. They are spread across the country with assets ranging $300,000 to more than $18 million.

How do they help small businesses? Three examples will give you an idea: An outdoor recreational equipment manufacturer in the Midwest badly needed $250,000 to expand his business; an SBIC provided it. A mobile home builder thinks he stands a good chance of getting $500,000. A bright, young engineer with a new idea in fasteners is about to see the dream of owning his own business come true.

Some of the investment firms chartered so far confine their lending activities to their own localities; others cover many states.

Only a few of them have gained enough experience to start plotting their futures. Many have had licenses to operate for several months but have yet to make their first investments. They must exercise the same caution that marks any commercial lending agency, planning to grow with the industries they invest in. Many of them do not borrow money from the government to get started, but all are under close supervision of the Small Business Administration. All carefully check potential borrowers (see checklist).

• **Typical Experiences**—Percentage-wise, few small firms are getting SBIC approvals on applications for funds. Some find that they can satisfy their needs elsewhere, escaping the relatively high interest rates charged by the SBICs and escaping abrogation of management prerogatives some SBICs demand.

The examples cited indicate the value of the SBIC now. It will take years to evaluate the long range benefits to the economy by giving small business a helping hand at the right moment.

The recreational equipment maker in the Midwest obtained his financing from Empire Small Business Investment Co. Inc., New York. Arthur P. Morgan, vice president, reports the firm received requests for loans or convertible debenture financing totaling $3 million in the first three months it held its license. Individual requests ranged $3000 from such applicants as corner drugstores to $1 million from such as relatively large manufacturers. Empire made only one investment during the period. It consisted of $125,000 on an unsecured note at 6.5 per cent interest to be paid in seven years. Empire also purchased $125,000 worth of ten year convertible debentures at 6 per cent from the same company.

Philip McCallum, administrator, Small Business Administration, comments on the interest rates: "Operating an investment company (in this field) is expensive and risky. All of its ventures may not be successful. The company is entitled to rates commensurate with the expense and the risk."

• **Advantage in Size**—One of the largest of the small business investment firms is Electronics Capital Corp., San Diego, Calif. In its first seven months of operation, it reviewed 450 small businesses. Charles E. Salik, president, says it found 100 of them with "the growth characteristics and qualifications which would justify further investigation." The firm made six commitments totaling $3.7 million, and continued serious negotiation with 20 other firms.

Mr. Salik believes an SBIC must have at least $5 million to give the sort of help to small firms which Congress envisioned when it passed the act. At 8 per cent interest,

that would generate $400,000 a year to cover such costs to the SBIC as rent, office expenses, and "the hiring of good executive talent."

The need for small business capital is pointed up by Mills B. Lane Jr., chairman, Citizens & Southern Small Business Investment Co., Atlanta: "Where a business is growing it cannot plow back sufficient money to keep up with its working capital requirements." Only SBICs with plenty of money to lend can keep up with growing industries.

• **Experience Is a Must**—One firm exemplifies the need for close linkage with management talent. Small Business Investment Co. of the Southwest, Dallas, is operated by Bennett, Osborne & Hall, financial and management consultants, Dallas.

Arch Scurlock, president of Atlantic Research Corp., Alexandria, Va., is also president of Greater Washington Industrial Investments Inc., an SBIC in the national capital. Atlantic Research is one of the country's best examples of a small business success, and Mr. Scurlock has turned part of his talents to the SBIC field because he believes many small firms merge with larger companies rather than grow independently when they cannot get the financing to grow. In the research field, it is common to hear of small firms which lack the financial ability to accept contracts for which they are eminently capable otherwise.

• **New Entry** — A new SBIC in Washington, Avionics Investing Corp., is headed by Andrew H. Bergeson, former vice president of Stromberg-Carlson Div., General Dynamics Corp. He believes, unlike some others in the field, that management is the first need of small firms, not capital. Efficient accounting practices, good cost estimation, and knowledge of seasoned business principles are among the basic needs of many small companies.

The firm will concentrate on providing such talents where needed, Mr. Bergeson says. Avionics won't try to bail everyone out, however. "Many small firms shouldn't be in business in the first place," he says. The SBIC pays 5 per cent to the government for the money it borrows. Avionics plans to charge borrowers 8 per cent. It does not consider this high, since it also plans to include management services designed to make the company grow.

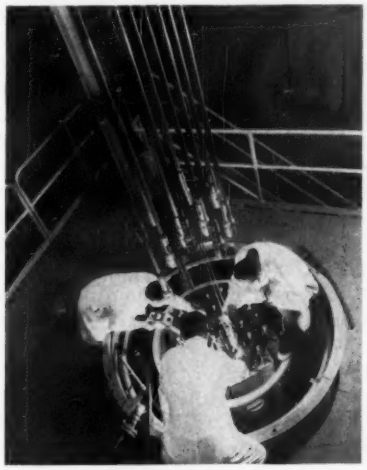
A good SBIC is not in business to take over a small company; it wants to lend money, provide services, and see its equity grow; then at the proper time, emphasizes Mr. Bergeson, the SBIC should pull out to put its talents and finances to use in another company. That is the concept behind the act.

• **But There Are Problems**—Many small firms fear the SBIC for just the reasons Mr. Bergeson hints at. Especially with a small SBIC, there might be a tendency to get into one company as deeply as it can and stay there, even come to control it eventually, by putting SBIC executives on the small firm's board and acquiring increasing stock. An SBIC is limited to putting 20 per cent of its own assets in any one firm, but may control as much of the firm as that 20 per cent will allow.

Where some SBIC protagonists see the concept as a new era in business financing, not unlike the federal home loan system, many small firms themselves continue to favor the usual channels of finding finances and executive talent. Interest rates have been one big roadblock: Howard I. Green, president, Small Business Investment Co. of Pennsylvania, Philadelphia, has told the Senate Small Business Committee that several applications for loans from his firm have been withdrawn because cheaper money was available elsewhere.

• **Syndicate Financing** — A forward step in SBIC history has recently been taken by seven SBICs headed by George J. Miller Jr., president, Baltimore Investment Co., Baltimore. The seven organized to buy $186,000 in the convertible debentures of Belfort Instrument Co., Baltimore. This step is a result of the National Association of Small Business Investment Companies' efforts to form six geographic groups of SBICs to act as clearing houses for their regions.

Such financing can speed benefits of the program to the country and small business. At the end of February, the Small Business Administration reported total capitalization of all SBICs licensed at $46 million, including $7 million from the government agency. That does not represent a great deal of progress since passage of the act 18 months ago, but the program can snowball as more small firms come to recognize their need for capital and better management and take advantage of what the good SBIC has to offer.



ATOMIC REACTOR built in the U.S. is readied for shipment to Mol, Belgium. It will go into an 11,500 kw powerplant to be completed this year. Westinghouse Electric Corp. technicians, who designed and built the reactor, remove one of 32 fuel elements from the core. Inside each tube are 90 uranium oxide pellets

BDSA Amends Priority Rule

An interim revision of a Business & Defense Services Administration regulation is aimed at unsticking any delays in material deliveries which might hinder space, defense, or atomic energy projects. The change in BDSA Regulation 2, the basic rule of the priorities system, makes mandatory the use of priority ratings in the acceptance and filling of defense contracts and orders.

Under the original rule, the use of priority ratings was permissive. Now, the only exception to the mandatory procedure is for individual purchase orders of $500 or less. The amended regulation now also permits the use of estimates of the quantity of materials needed to replace inventory used to fill rated orders.

Administrator William A. White says complete revision of Regulation 2 is underway.

Army Needs $175 Million in Machine Tools . . . Industry Should Spend $1.5 Billion . . . Hot Metal Contracts

Where the Army Tool Program Stands

• A new emergency would put us in the same position we were in at the beginning of World War II and again at the outset of the Korean War.
• In the 1960s, the obsolescence cycle for machine tools is five to six years, not eight to ten years, as it was during the 1950s.
• By 1965, at least 90 per cent of U. S. tools will be ten years old or older.
• A five year, $175 million program is needed to modernize the Army's tools.
• To keep ahead of demands, the Army must institute a broad research and development program in production technology.

Part of a long-classified study of the Army's tool program has been made public.

Done by the Operations Research Office, Johns Hopkins University, Bethesda, Md., the project points up several significant facts about our mobilization base, the least of which is the urgent need for someone in government to close the information gap between the armed services and industry.

The university study is designed to provide a basis for Army decisions pertaining to the disposal, retention, or modernization of its production equipment. The conclusions of the research group are not necessarily those of the Army, it points out. At this time, there is no program for implementing the study. The kickoff must come from Congress, because money is ultimately involved in those conclusions which directly affect the Army's tool program. Otherwise, the study is an indictment of the nation's depreciation laws, and points up the significance of the lack of long range, industrial planning.

At the end of fiscal 1958, the Army had 88,000 tools, representing an acquisition cost of $1 billion and 4 per cent of the total supply of tools in the U. S. About 43 per cent of the tools are of World War II age or older; 51 per cent are from the Korean era; only 6 per cent are post-Korean.

• To fully modernize U. S. metalworking, the study states industry should buy 150,000 tools annually, at a cost of $1.5 billion to $2 billion, compared with the $560 million or so now spent by industry.

Our current buying represents "relatively complete obsolescence," sums up the report.

On Army tools specifically, the research team charges: Few can use the new advanced controls, the high power inputs, or the improved cutters now available.

• The report advocates a "realistic, normal rate of depreciation of five or six years, rather than the traditional and modernization-inhibiting 15 to 20 years."

Ninety per cent of the Army's ten year old tools should be disposed of via foreign aid or the school program which the Business & Defense Services Administration has been working on.

The Army needs a minimum of 1500 new tools a year which would cost $175 million over a five year period. Finally, because modern weapons are short lived, the research study suggests an R&D program be started by the Army to keep its production facilities capable of building the most modern weapons as demand is created.

Clean Bill for Aluminum

Such organizations as the American Die Casting Institute and Aluminum Smelters Research Institute appear to be making little headway with the Justice Department or the Federal Trade Commission over their contentions that the hot metal contracts between primary aluminum producers and automobile manufacturers constitute "unfair" price advantages.

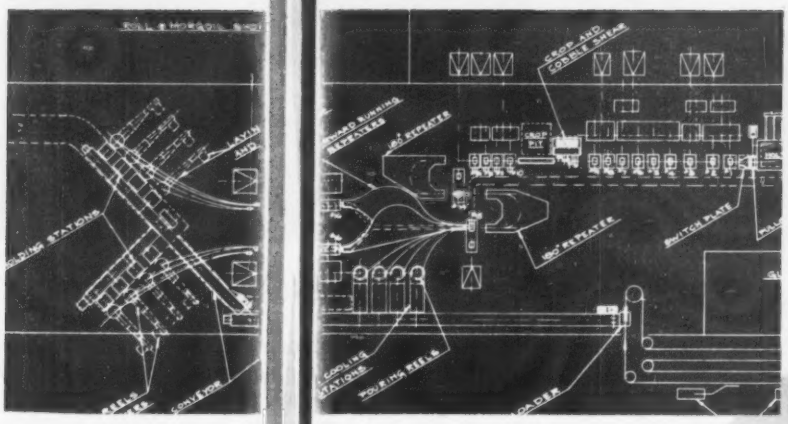
Hearings by the House Basic Metals Subcommittee last week revealed that Justice washed its hands of the hot metal contracts last year, saying that if anything was wrong, it was the concern of the FTC. As recently as February, the FTC was ready to close its case unless the complainants provided additional evidence. The agency did receive further information so, presumably, the investigation is still open, but from what witnesses reported at the hearings, there is little likelihood of any action against the aluminum producers.

The diecasters told the subcommittee one hot metal contract cuts prices to the auto firms "six to eight times" what the reduction should be, according to the savings possible by "eliminating pigging." No precise breakdown of costs was introduced, however. What did show up was the revolution which has occurred in the aluminum diecasting business since 1955. The independents' share of the auto market has been reduced from about 71 per cent in 1955 to 38 per cent in 1959.

Auto manufacturers consume 45 per cent of the aluminum diecastings produced.

Another major complaint to the subcommittee was that a potential shortage of aluminum scrap in this country will work havoc among independent smelters. Members of Congress listened politely, but as with the fabricators' case against hot metal, they expressed little enthusiasm for the cause.

Your Customer's Requirements Draw the Specifications for MORGAN Rolling Mills



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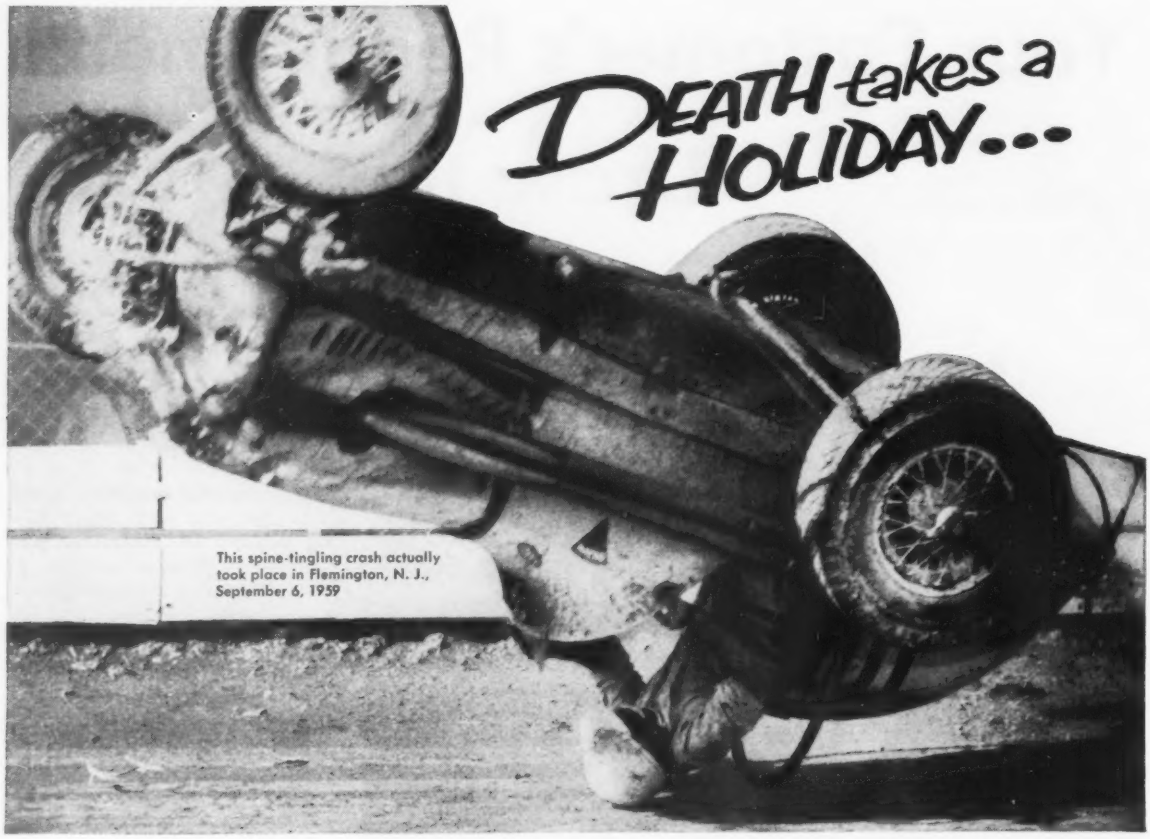

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How Singer Sells the World Market

An eight-pronged attack on world markets promises to make Singer Mfg. Co.'s second century more glorious—though more troublesome—than its first. No big U. S. metal-working company is more dependent on foreign business than 109-year-old Singer. You can borrow its strategy to shore up your defenses against foreign competition and to plan your attack on the export market.

ABOARD a salmon trawler off the Alaskan coast, in the tent of the Sultan of Dankali, under the steaming jungle foliage of the Belgian Congo, or in a New York penthouse, Singer is the household word for sewing machines. Last year, Singer sold around 2 million machines through 19,630 outlets in 155 countries.

Singer is the only major U. S. producer of household sewing machines left. The others, like the Christians in the lions' den, have succumbed to a competition created by their own government. Encouraged by General MacArthur's advisers to get into the sewing machine business after World War II, the Japanese have taken advantage of negligible tariffs to flood the U. S. with their low cost products. From only 16,000 units in 1949, the Japanese have built up their U. S. sales to more than 1 million annually—1,093,000 last year.

Singer's share of the U. S. market has dwindled from 65 per cent before World War II (when its competition was other American companies with like costs) to 33 per cent today (when it must pay its average production worker at Elizabethport, N. J., ten times the hourly wage paid by its Japanese competitors).

That Singer is still in business testifies to its managerial effectiveness; more laudable is the fact that it has a tight grip on one-third of the world market for sewing machines and is boosting its profitability—1959's earnings jumped 53 per cent above those of 1958. The company is selling its wares in the backyards of its fiercest competitors—Japan, Italy, Germany, Switzerland. Singer's foreign dollar sales have risen nearly 60 per cent in the last decade. Here are the key reasons for Singer's success . . .

• **Sharp Marketing** — No foreign competitor is able to field a sales team that could equal the tens of thousands of mercilessly aggressive

Singerites who are showing their wares to housewives from Aden to Zanzibar. How aggressive are they? One sold two machines while caught in a traffic jam. Nor has any competitor equaled Singer's distribution system of some 5000 company operated sewing centers. (The firm also has 14,500 independent dealers and distributors.)

But Singer's forte is the unconventional approach—creative selling, American style—which has enabled it to cover the globe with 100 million sewing machines since it started business. A favorite gimmick in the Far East is the "kite tail"—to show the versatility of the machine, a demonstrator rapidly stitches together a business card, a piece of plastic, some matches, 20-odd thicknesses of folded cotton, two pins, a slab of leather, a strip of organdy, and some cleansing tissues.

In parts of Europe and Africa, it sends demonstration vans into the small towns on market day—and will sometimes peddle a truckload of machines to the farmers and merchants who come in by mule, camel, bicycle, or on foot to buy and sell in the village square.

To sell the consumer market in all the nooks and crannies of the earth, you must pay special attention to the customs, superstitions, attitudes, and prejudices of the local populace—as well as have full knowledge of their economic circumstances. So Singer naturally employs nationals to handle sales and service. But even the home office management needs an insight into the idiosyncrasies of each community. Singer "gets close to the people," and caters to their quirks. For example, hand machines shipped to the Belgian Congo and adjacent territories bear a special colorful transfer design. In Thailand, Malaya, Singapore, and Ceylon, machines are sold with the oily shipping tags still attached —the people believe this is the only proof that a machine is brand new. The location and decor of Singer's sewing centers varies considerably too. In many underdeveloped countries, the people are reluctant to enter a clean, modern shop. So Singer locates close to the slums.

Singer also sponsors sewing contests (with prizes up to $25,000), "flying schools" (around 50,000 Italian girls annually learn to sew at Singer's expense—in rented halls and even monasteries); "Sew and Save Weeks" (a Latin American promotion); "propaganda vans" (a lumbering vehicle—that looks like a parcel truck converted to circus wagon—is equipped with tape recorder, loud speaker, fold-down sides, and aggressive salesmen; it's sent into a town on market day to give the Singer sales pitch).

• **Production Efficiency**—To combat foreign price competition, Singer has poured $7 million into a new, semiautomatic plant at Elizabethport, N. J.—a big step for a company founded on $40. The new, 180,000 sq ft plant houses more than $5 million worth of new equipment. Included: 1. A system of conveyors, a mile-and-a-half long, electronically scheduled from a programing console. 2. A Detrex ultrasonic cleaning unit. 3. A $600,000, Ransburg, electrostatic paint system. 4. $2 million worth of special machines and tools, including a Bodine automatic indexing machine that can perform 19 separate operations, including drilling, reaming, tapping, and screw assembly. 5. A captive diecasting shop that turns out 21 aluminum parts and a few zinc items on $1.5 million worth of new equipment. 6. Automatic multihead boring, drilling, and tapping machines, set up in groups of three or four and manned by one operator. Locating and clamping are automatic. (Singer likes automation because "operators are not around to 'baby' the machines.") 7. A programed system of eight conveyors and transfer units that eliminates manual handling in the finishing area. 8. An automatic machine that turns out 32,000 chromium plated parts in an 8-hour shift.

• **Standardization**—Singer believes that one of the best ways to design cost out of a product without reducing quality is through standardization. So the firm has established a continuing campaign to do just that. First—and dramatic—result: Six cast iron units and one aluminum machine were scrapped in favor of a single basic machine in three models. One model has 360 parts; another has 340; the third takes 275—230 parts are common to all models.

• **Advanced Design**—In 1948, Necchi of Italy set Singer back on its bobbin by selling the first household zigzag machine in the U. S. Singer had been making such a machine for its commercial customers since 1892 but hadn't figured that the housewife would want such a device. So imports soared from fewer than 30,000 in 1947 to 1,017,000 in 1957—when Singer finally was able to leap to the fore, designwise, with its Slant-O-Matic.

The firm still makes hand-cranked machines (for the African market) and treadle machines (for Asia and Latin America).

• **Manufacturing Abroad** — The firm is becoming about as prolific as its founder, Isaac Singer, who sired 24 children by two wives, three known mistresses, and an uncounted number of ephemeral companions. The company now has 16 foreign plants—half built since 1950—and is building a seventeenth —in Argentina. More than 70 per cent of its machines are made outside the U. S. and Canada.

Most postwar facilities (Australia is the notable exception) were established because of a "gentle blackmail" on the part of foreign governments: They tightened import restrictions to the point where it was "build there or lose the market."

But the move has some tremendous cost saving implications. The average production worker at Elizabethport earns three-and-a-half times as much as his counterpart in Scotland, six times the Italian rate, eight times the Mexican, and ten times the Japanese. But Singer intimates that productivity abroad does not match that of the U. S. worker.

The firm has no plans to import machines or parts from Japan.

• **Reliability**—Few companies have so successfully linked dependability to their corporate image as has Singer. The fact that "Grandma's had one for 30 years and it still purrs along" can be a convincing argument for granddaughter to buy the same brand.

Some reliability ingredients: Organized preventive maintenance, frequent inspection, thorough testing of each machine, close attention to quality of material, being "fussy about standards."

Indications of the firm's reputation for reliability: Pawnbrokers loan more on Singers than competitive makes. In Manila, a Singer "can always be pledged to finance a wedding, christening, or funeral," says Karl Kreutz, the local manager.

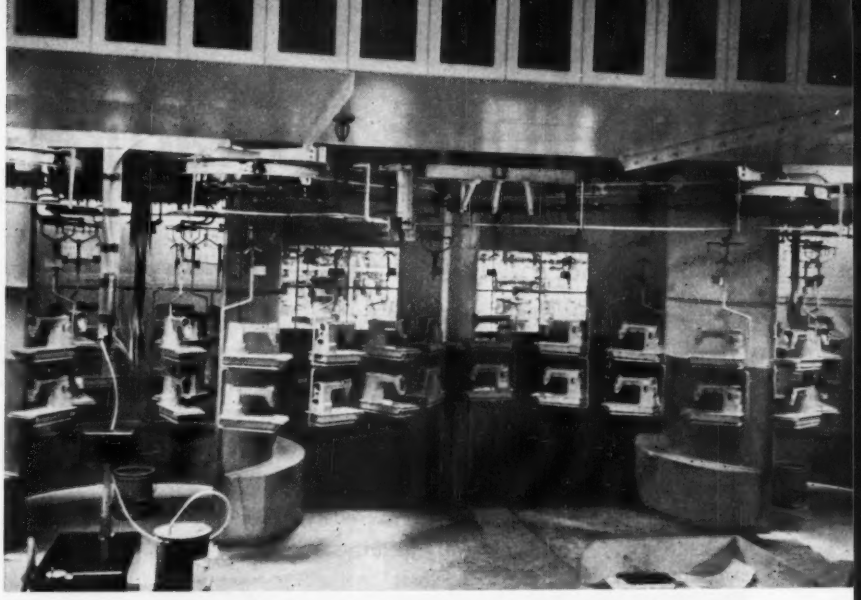
• **Distribution** — Singer has revamped its distribution setup somewhat. To combat import inroads, Singer has augmented its sewing centers with 80-odd outlets in leased areas in department stores and some 250 franchised dealers in the U. S.

It also tailors its distribution setup in each foreign country to fit the special habits of the people there. Example: In the Philippines, its shops are kept simple and dainty; in France, stores are the ultimate in cleanliness and orderliness and are staffed by young ladies; in French Morocco and some other "underdeveloped" nations, the shops are little "holes in the wall," purposely kept untidy—because the people are inherently shy and veer away from modern establishments.

• **Liberal Credit**—Singer pioneered installment selling; Edward Clark, Isaac Singer's early partner, established a "hire-purchase" plan (requiring a $5 down payment) and practically doubled the firm's sales overnight. The company has extended this system around the world. Japan is a good example of the necessity of such a method. In a country of 90 million people where per capita income is only about $200 annually, a sewing machine is a major capital expenditure.

• **Materials Efficiency**—Singer has an organized campaign to wring the most quality out of the fewest dollars spent for material. It justifies material switches via an exhaustive cost study. On one part, it switched to diecast aluminum—although the raw material cost three times as much as the material previously used and some new equipment was needed. Justification: A 75 per cent savings in direct labor costs, due to elimination of some machining and handling operations, plus a huge saving in maintenance and perishable tools.

• **R&D**—Singer knows its attack on the world market could falter if any link in its economic chain weakened. One guard against that is the constant self-examination; another is its stepped up research and development work. In 1959, it poured 12 per cent more dollars into R&D than in 1958—or four times the amount budgeted just five years ago. It's working on automatic sewing devices, special needles and lubrication systems, machines to handle the special problems created by commercial sewing of synthetic fabrics.



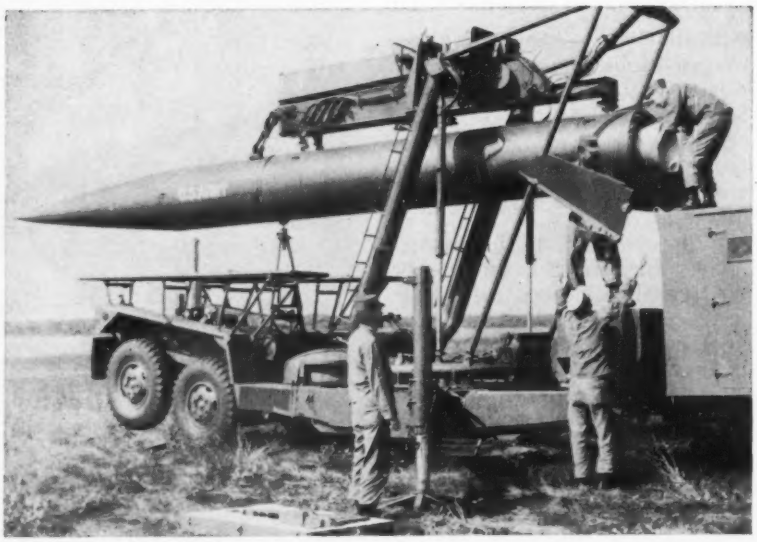
This electrostatic painting line is among the efficient facilities at Singer's new, $7 million, plant in Elizabethport, N. J.

In Singer's Japanese plant—one of 17 foreign facilities—machines are readied for shipment to the firm's 500-plus Japanese retail outlets

• If you'd like to have a copy of this article, write to Editorial Service, STEEL, *Penton Bldg., Cleveland 13, Ohio. You may win $1000 by using material like this in* STEEL. *For details, see the Servicenter, Pages 5 and 6.*

Army Builds Up Tactical War Muscle

U.S. industry has a wide range of important parts to play in the development of the service's ground war capability



A mobile launching platform enables Army crew to assemble the new Sergeant missile for firing in minutes. The light launcher can be transported by air

MODERN WARFARE came down to earth at Ft. Benning, Ga., last week. Some 600 business and government executives joined President Eisenhower in observing a demonstration of the Army's capability for fighting the next war with ground troops rather than intercontinental missiles.

Army Ordnance is currently spending $2.4 billion a year; $1.1 billion is for weapons already developed, $700 million for developing new weapons, $400 million to supply the troops and maintain their equipment, and the rest for training. Additional millions will be spent for equipment emerging from research and development or already set for production. The timing depends on how soon Congress appropriates more money.

• Most of the money would be distributed widely among metalworking companies.

For example, 1300 companies in 20 states contributed to the production of 10,000 Nike Ajax missiles as subcontractors to the Western Electric Co.

At Ft. Benning, Gen. Arthur G. Trudeau, chief of Army research and development, said the job is to provide a variety of weapon systems to meet the dual threat of all-out nuclear war or local aggression with nonnuclear weapons. Needed, he said, are lightweight weapons that can be transported readily by air and rugged weapons for sustained ground combat under the worst possible conditions.

The latest addition to the Army's family of advanced tactical weapons is the Sergeant, a medium range ballistic missile being produced by Sperry Rand Corp. at Salt Lake City, Utah.

The launcher for the Sergeant is built with U. S. Steel Corp.'s "T-1" steel, heat treated to a yield strength of 100,000 psi. Among the 200 other new items displayed last week:

• The M-60 medium tank, the first production model of which rolled off assembly lines last month at Chrysler Corp.'s Newark, Del., plant. Armed with a 105 mm gun, the M-60 is 3000 lb lighter than its predecessor, the M-48, and employs 3.5 tons of aluminum in road wheels, engine, and fuel tank.

• Two new amphibious vehicles, developed by Ingersoll Kalamazoo Div., Borg-Warner Corp., designed to transfer cargo from shipside to inland unloading points.

• A missile monitor, developed by Hughes Aircraft Co., Fullerton, Calif., which automatically tracks targets and flashes the information to Hawk or Nike missile batteries.

• Davy Crockett, the first tactical atomic weapon system. It's light enough to be carried over any type of terrain, set up, and fired by a three man infantry team.

• The Hawk, developed by Raytheon Corp., Waltham, Mass. It's a radar guidance system that destroys low flying aircraft and missiles at tree-top level.

• A new, highly mobile, trailer mounted radar system, in production at General Electric Co., that pinpoints enemy mortar sites more than 6 miles away. (Also well along at GE is development of "Operation Butterfly," a new concept in high power, long range, mobile radar detection. The equipment has folding antennas.

• Martin's Pershing missile, designed to replace the Redstone, in the flight phase of R&D at Cape Canaveral, Fla. It will be carried by a tracked vehicle.

• A new helicopter, powered by two gas turbine engines, developed by Vertol Div., Boeing Airplane Co., Morton, Pa. It can transport 27 fully armed troops to the front line, or carry a Little John missile with its nine-man firing crew, or three antitank rifles and their crews.

• Lacrosse, surface-to-surface solid propellent missile, being built by Martin at Orlando, Fla.

• New, high powered rifles and other small arms for the infantry, including the shoulder-fired missile, the Redeye.

Hendrick dehazer lifts the haze from lube oils

The Hendrick Hydro Dehazer removes haze from lube oils quickly and economically, without using compressed air, high heat, chemicals or other additives. The Hydro Dehazer's huge rotor mixes moisture—laden oil with free air until the moisture is absorbed, rises to the top, and is discharged.

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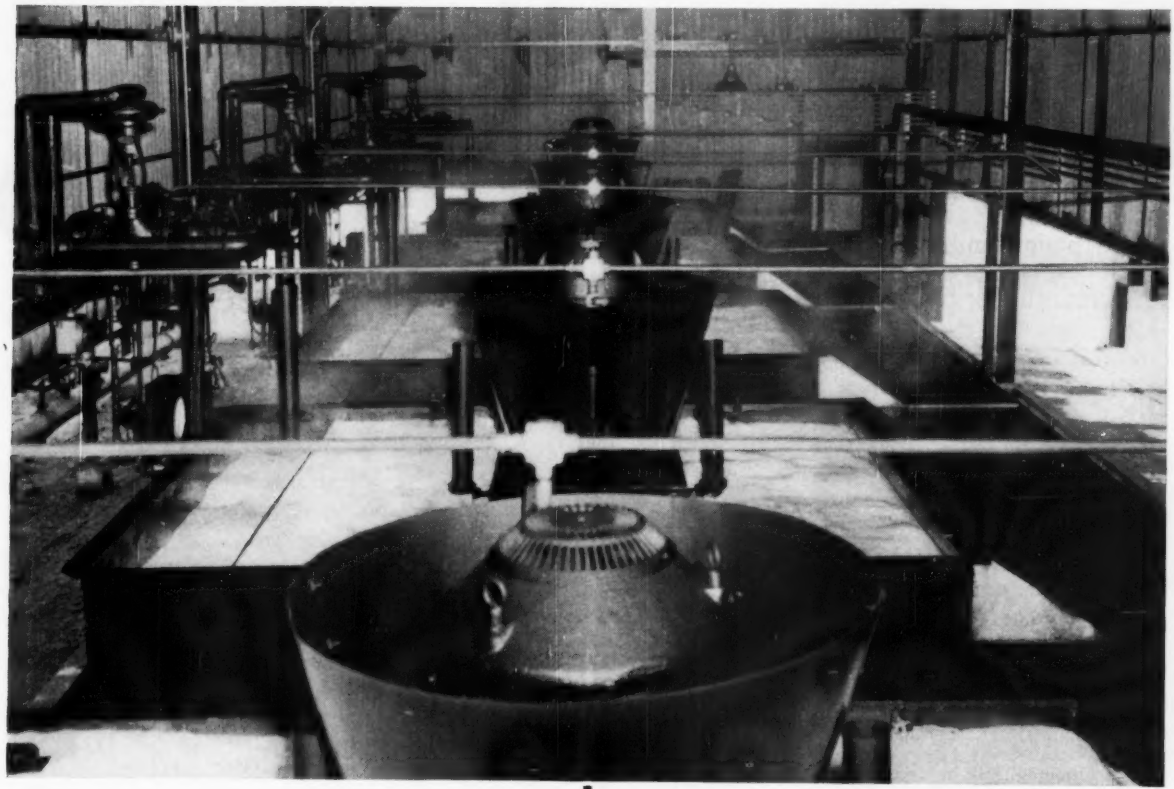

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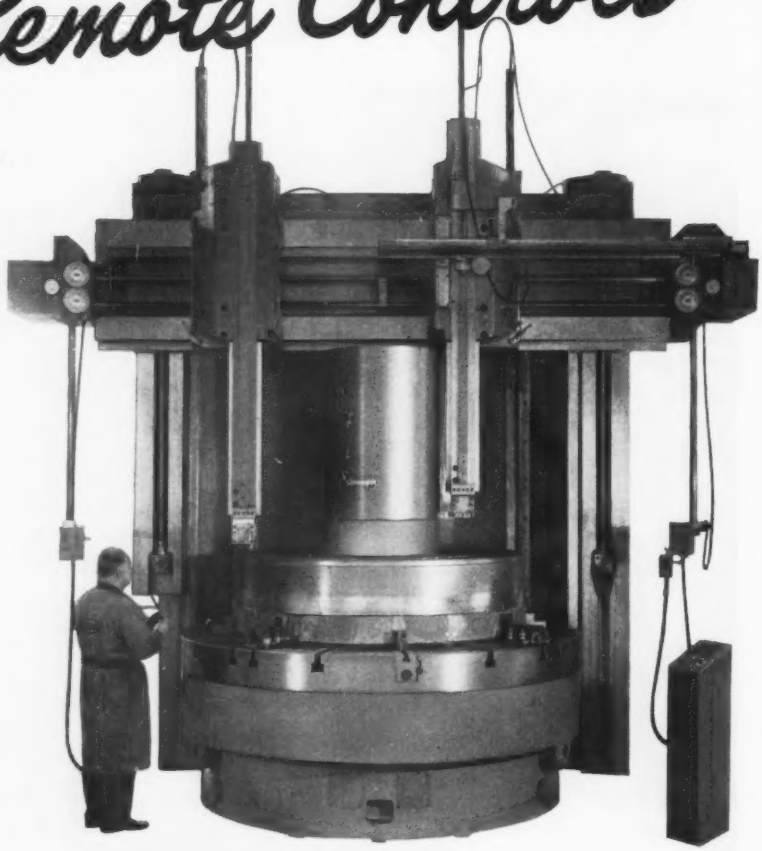
Within the span of a man's hand, utilizing a stationary and portable pendant, are all the controls necessary to actuate these modern giant mills. No climbing or clamoring for buttons or levers – every function of the machine is controlled from a position most advantageous to the operator.

The stationary pendant controls feed rate, table speed, starting and stopping of the table – also table jogging.

The portable pendant controls direction of heads in traverse or feed for either horizontal, vertical or 45° travel.



108" Dynatrol Vertical Boring and Turning Mill
Capacity – Maximum swing 120"; Height under rail – 80"; Ram travel – 60"; Table speed ranges, optional, Low 1.4 to 50; Int. 2.1 to 75; High 2.8 to 100; Feed rates infinitely variable from 0-500; available with Plain Table, or 4-jaw independent built in chuck.

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Automakers Ready '61 Compact Cars

Detroit plans to add four more models to its six lines of compact cars. Three are GM cars; the other is a Dodge. In this second installment of a two part series, STEEL gives the latest reports on compact plans for '61. Last week's report covered styling changes in standard models.

Chevrolet's Corvair

THE '61 CORVAIR will look a lot like the '60. Its engine has been virtually rebuilt during the current model year to overcome carburetor icing, poor gas economy, fan belt slippage, and head sealing problems.

Chevrolet is now concentrating on its compact truck and station wagon. The truck is entering pilot line production. It will have side loading doors, and the driver will sit directly over the front wheels. Some 47 models will be built up at Chevrolet's Flint, Mich., plant.

The Corvair wagon will have the sedan's wheelbase but a separate body, say informants. Contrary to popular belief, it will have a one piece rear door.

Engineers claim Chevrolet plans to make the 95 hp engine pack standard on all Corvairs. But the decision is still open to change by marketing men in the division.

• **Buick, Olds Compacts**—Built on 112 in. wheelbases, they'll share many of the Corvair body shell panels, but sheet metal skins will follow the style trends of the larger cars in each division. Reports are that both cars will have rear quarter windows and something of a fast back (sloping) design. Height is supposed to be 51.5 in. Both compacts will use a front mounted, water cooled, aluminum V-8 engine with 215 cu in. displacement. It will turn out better than 145 hp. Advertised horsepower may be less. Engine blocks will be permanent mold castings. They'll use sand cast heads.

The Olds will have the junior sized Hydra-Matic transmission being produced at Detroit Transmission Div. Buick reportedly will have a slim line Dynaflow. Independent coil suspension will be featured on the cars. A multiyoke driveshaft will link engine and transmission to the differential. Buick's compact may be called the Invader. Some insiders claim the Olds will be dubbed the Rocket.

Pontiac's small car also will have the 112 in. wheelbase. Length is reported as 190 in., width 67 to 68 in. Although the car will share many of the Corvair body components, its styling will be distinctly different from the Buick and Oldsmobile cars. A four door sedan and a four door station wagon are included in the model line. Best word on names: Panther or Tempest, with odds favoring the latter.

The powerplant will be a four cylinder, water cooled engine (194 cu in., gray iron). It looks like half of Pontiac's regular V-8 and can be run though the same V-8 machining line. The engine will be front mounted at a 45 degree angle. When automatic transmissions are specified, the torque converter will be mounted with the engine in front of the firewall. Corvair's transaxle will be used in a reversed position, which means that only a small driveshaft tunnel will be needed to link engine and converter with the transaxle. Engineers say it's the first step toward a whipshaft at Pontiac.

Rumor has it that Pontiac will

AMC's Rambler

Chrysler's Valiant

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offer Corvair's pancake aluminum engine as a front mounted option. The Olds and Buick aluminum V-8 may be a second option. Like its brethren, Pontiac's compact car will have a fully unitized body. Model announcements are expected in mid-September.

Ford's Falcon

Ford's Comet

S-P's Lark

• **Ford's Favorite**—Falcon will be relatively unchanged. The engine will not be altered although Ford is expected to re-offer the optional power package it pulled back earlier this year. Slight modifications of grille and interior appointments are programed. More brightwork will be added to luxury trim package. There's talk about a convertible—but not for '61.

Comet will also continue as is, although a convertible is expected later in the model year. Horsepower will be increased, say engineers. It's expected that the 144 cu in. Falcon engine will be bored out for the Comet, providing up to 135 hp, against Falcon's advertised 90 hp. Comet previews are expected in July, although model introductions may be six weeks later.

Ford's Hummingbird (Segment III) project still is under design. It's ready to go into production tooling, but Ford apparently has not made a final decision on the 1643 lb car. It's still expected to be released. Much of the tooling will be done in Europe. A four cylinder, inline, gray iron engine has been programed for the 95 in. wheelbase car. Contrary to reports, it will not slide out on rails for servicing. Front wheel drive had been scheduled but may be dropped for cost reasons. Ford has two front wheel drive projects going, but it recently revived an old transaxle project.

• **Chrysler**—Chairman L. L. Colbert, has confirmed that Dodge will offer a compact car called Lancer. It will be built on Valiant's 114 in. wheelbase and share many Valiant body shell components as well as the Slant Six aluminum engine. But styling is expected to follow Dodge Dart lines. The Lancer will follow Chrysler engineering trends with a unibody and torsion bar suspension. A convertible is programed for the line. With Dart and Matador, Dodge now has a three model lineup, ranging from the low compact to just below the luxury lines in price.

Some styling changes will be made in the Valiant. The phony rear deck tire well will be eliminated and a change in tail lights is planned. Look for a cloth top too. Few other styling changes are anticipated. All Chrysler compacts will have alternators instead of generators.

• **AMC**—Ramblers will get new grilles. The Ambassador will not be dropped. The American will be unchanged although a convertible model will be in the lineup. Wheelbases will remain at 100, 108, and 117 in. AMC hopes to have an inline, six cylinder, diecast, aluminum engine in operation if it can lick bugs encountered in bonding the head to the engine block. The V-6 aluminum engine is still under design—and a long way from tooling releases. AMC probably will have to start out with its conventional, 127 hp, six cylinder engine (gray iron). Word is that it will be dropping the 90 hp L-head engine now used in the American. The 100 in. wheelbase car will use the standard six engine, claim tool shops.

• **Studebaker**—Look for Studebaker-Packard to revive the Hawk as a luxury compact. Lark is reportedly planning minor sheet metal changes on rear ends. The grille will be new. Minor refinements in the power train group are planned for more economy. Automatic transmissions will undergo a few minor engineering changes. Interior trim and styling are being redone. Wheelbase, height, and length won't be changed.

U. S. Auto Output

Passenger Only

	1960	1959
January	688,731	545,757
February	659,323	478,484
March	654,242	576,085
April	585,300†	578,825
4 Mo. Totals	2,587,596†	2,179,151
May		546,817
June		557,994
July		555,418
August		239,152
September		258,157
October		507,530
November		254,527
December		494,931
Total		5,593,677

Week Ended	1960	1959
Apr. 2	147,830	133,878
Apr. 9	133,460	133,202
Apr. 16	135,402	135,934
Apr. 23	144,886	133,987
Apr. 30	138,311†	118,059
May 7	145,000*	134,763

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

This coil-fed Wean "Flying Press" line performs both shearing and blanking operations.

Massey-Ferguson saves up to $9 per ton on material costs with Wean coil processing lines

As a measure of its products' popularity, Massey-Ferguson, Ltd. of Toronto cites the fact that M-F combine and baler production fills every available Canadian railroad flat car twice a year.

Five years ago, Massey-Ferguson's production and purchasing personnel made a thorough cost study of their extensive steel demands, then being provided by shearing from purchased sheets. As a result, three Wean coil processing lines were installed to supply these requirements directly from standard coil.

The three Wean lines are: (1) an edge-trim and cut-to-length line, with a flying shear; (2) a Wean slitting line; and (3) a Wean "Flying Press" line that offers the versatility of straight or angle shearing or blanking of coil stock, all in one machine.

Massey-Ferguson management credits this coil processing system with savings of from $4-9 per ton of metal consumed. And besides the direct production savings in sheet supply, the threat of model-change obsolescence is removed when steel inventory is in coil form.

Many metalworking firms have had similar experience in the profit-making aspects of coil processing equipment. The concept and economics of coil processing are discussed in a new brochure available from Wean. Write for your copy of this informative catalog.

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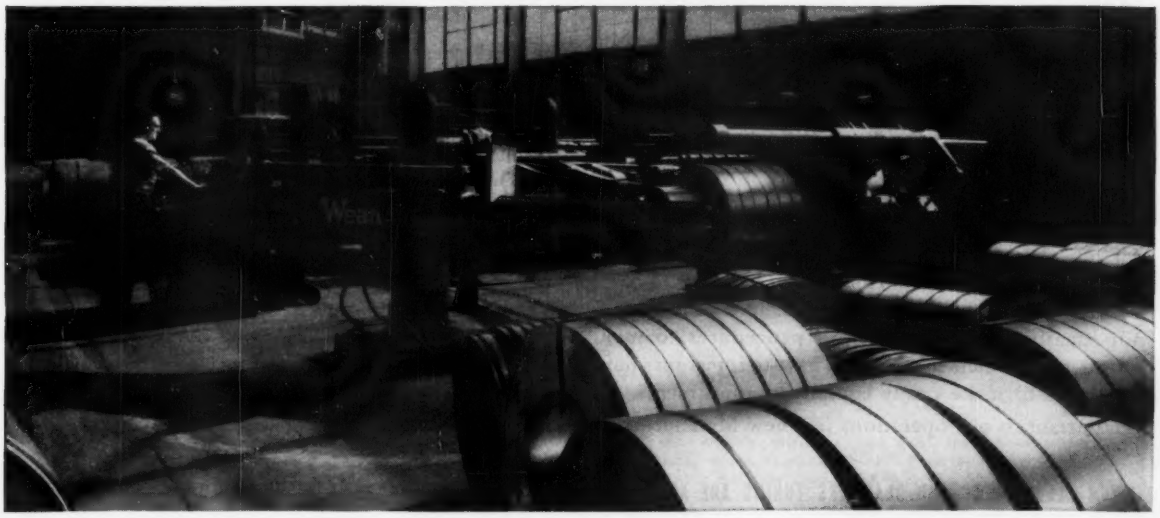
Standard coils are slit to a wide variety of widths on this Wean line at the Toronto M-F plant.



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*Week ended Apr. 30.

Construction Coming to Life

CONSTRUCTION, the perennial spring tonic for that depressed, winter business feeling, is working its wonders again. And with continuing improvement in the weather, the dosage is likely to be increased.

The construction industry showed signs of weakness during the winter months, but it began to regain its strength in March, and it's still on the mend. While work put in place is lagging, it seems certain that a significant upturn in contracts awarded and fabrication bookings will change that trend in due time.

• **First Sign**—While March may have been a poor month for outdoor construction, it apparently was just right for letting contracts. The F. W. Dodge Corp. report for that month notes a jump in awards for future construction to $3.0 billion from February's $2.2 billion. (See graph and table, Page 116.) While this still left March 9 per cent behind the corresponding year-ago figure, it caused Dodge's seasonally adjusted index to rise significantly above the January-February level. The biggest factors were gains in manufacturing building, schools, public building, and commercial building.

Further proof of the upswing was the boost in fabrication activity. Bookings for fabricated structural steel in March came to 342,859 tons, the highest figure for the month since 1956, bringing the first quarter total 9 per cent above the similar 1959 period, says the American Institute of Steel Construction Inc. Shipments also increased but at a slower pace, partly because of weather conditions. The first quarter ended up 4 per cent ahead of the 1959 first period. And the industry backlog rose for the second consecutive month. It stands at 2,364,390 tons, the best total since April, 1958.

• **A Private Affair** — The uptrend has continued to gain strength. *Engineering News-Record* reports that

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,132[1]	2,210	2,604
Electric Power Distributed (million kw-hr)	13,200[1]	13,213	12,546
Bituminous Coal Output (1000 tons)	8,560[1]	8,775	8,225
Crude Oil Production (daily avg—1000 bbl)	6,950[1]	6,983	7,113
Construction Volume (*ENR*—millions)	$493.1	$758.2	$316.7
Auto, Truck Output, U. S., Canada (*Ward's*)	175,540[1]	181,705	154,719
TRADE			
Freight Carloadings (1000 Cars)	650[1]	625	674
Intercity Truck Tonnage (changes from year ago)	−4.8%	−5.0%	+19.6%
Business Failures (Dun & Bradstreet)	283	308	300
Currency in Circulation (millions)[3]	$31,582	$31,828	$31,244
Dept. Store Sales (changes from year ago)[3]	+4%	+18%	+4%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$26,443	$27,132	$24,694
Federal Gross Debt (billions)	$289.1	$288.9	$285.6
Bond Volume, NYSE (millions)	$26.5	$28.6	$29.6
Stocks Sales, NYSE (thousands of shares)	14,973	14,969	17,776
Loans and Investments (billions)[4]	$103.6	$101.3	$102.7
U. S. Govt. Obligations Held (billions)[4]	$26.2	$24.5	$32.2
PRICES			
STEEL's Finished Steel Price Index[5]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[6]	230.7	230.7	220.7
All Commodities[7]	120.0[1]	120.0	119.8
Commodities Other than Farm & Foods[7]	128.6[1]	128.6	128.0

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1960, 2,844,306; 1959, 2,831,846. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-39=100. [6]1936-39=100. [7]Bureau of Labor Statistics Index, 1947-49=100.

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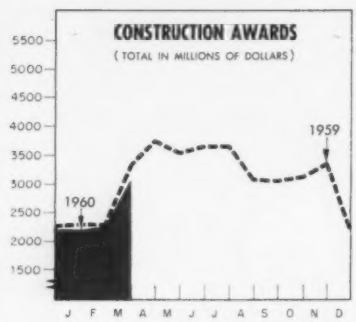
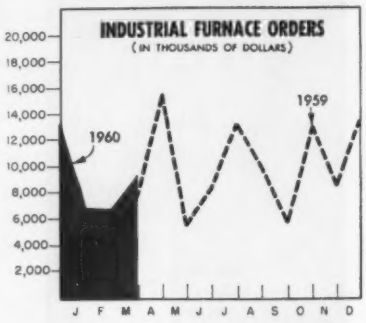
THE BUSINESS TREND





	Total 1960	Total 1959	Building 1960	Building 1959
Jan.	2,192.9	2,314.4	1,728.4	1,834.9
Feb.	2,239.5	2,307.0	1,685.1	1,777.4
Mar.	3,046.3	3,339.9	2,361.1	2,453.9
Apr.	.....	3,778.4	.....	3,018.0
May	.....	3,541.9	.....	2,748.8
June	.....	3,659.0	.....	2,816.9
July	.....	3,656.5	.....	2,880.8
Aug.	.....	3,083.6	.....	2,512.3
Sept.	.....	3,058.1	.....	2,472.3
Oct.	.....	3,134.5	.....	2,518.4
Nov.	.....	3,372.8	.....	1,893.0
Dec.	.....	.....	.....	1,783.4
Totals	.....	36,475.0*	.....	28,714.9*

*Monthly figures do not add up to totals because of yearend revisions.
F. W. Dodge Corp.
Charts copyright, 1960, STEEL.

	1960	1959	1958*
Jan.	6,827	4,545	3,047
Feb.	6,784	3,596	3,684
Mar.	9,345	7,842	2,871
Apr.	....	15,517	3,572
May	....	5,315	954
June	....	8,230	3,672
July	....	13,141	5,169
Aug.	....	9,738	3,533
Sept.	....	5,560	4,846
Oct.	....	12,967	3,105
Nov.	....	8,442	5,597
Dec.	....	13,437	4,284

*Does not include industrial ovens.
Industrial Heating Equipment Assn. Inc.

last month was the best April on record for heavy construction contract awards. The total, $2 billion, was 25 per cent ahead of the March pace and 29 per cent above the April, 1959, level. The year-to-year gain at the end of the first three months was only 1 per cent. Now it is 8 per cent. The big push is in private building, which is 23 per cent ahead of the year-ago figure.

Two big consecutive weeks made the difference in April. The $758.2 million total for the week ended Apr. 21 was the biggest value reported since 1952, when large atomic energy projects inflated the report. While the last week in April fell beneath its predecessor, the $493.1 million total was still the third best weekly figure for 1960. In both cases, it was private building, led by mass housing, which led the way.

Industry Reports Varied

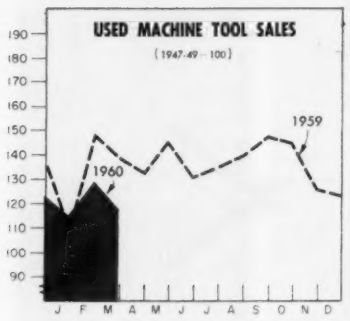
Analysis of the latest reports from individual metalworking industries bears out what many observers have contended for some time: This year will be good over-all, but not all industries will share equally in the prosperity. Of eight recent reports, three show increases, three declines, and two little or no change from the preceding month.

• Producers of industrial furnaces chalked up new orders worth $9,345,000 in March, a gain of 38 per cent over February's volume. (See graph and table above.) Orders in the first quarter increased 40 per cent over those in the corresponding period of 1959.

• Makers of gas ranges posted their second consecutive improvement in factory shipments in March. Led by built-ins (which gained 24.9 per cent over the same 1959 month), total shipments climbed to 171,200 units, topping the year-ago pace by 1.8 per cent, says the Gas Appliance Manufacturers Association.

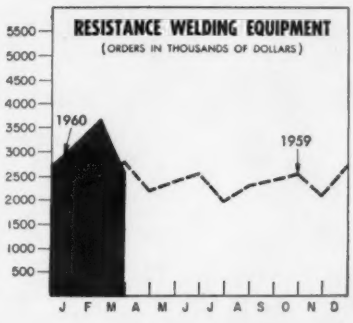
• Heat treaters had their biggest month in history in March, billing $3,835,100 worth of business. Billings for the first quarter were 20.9 per cent ahead of those in the first quarter of 1959, reports the Metal Treating Institute.

• Machine tool builders, whose business has remained fairly stable since mid-1959, apparently owe that stability to their export business. March foreign orders of cutting type



	1960	1959	1958	1957
Jan. ...	115.0	109.5	121.1	n.a.
Feb. ...	129.3	148.1	121.9	n.a.
Mar. ...	117.8	139.3	106.3	n.a.
Apr. ...	....	132.9	105.0	152.1
May ...	....	145.7	99.5	132.6
June ...	....	131.3	111.9	137.0
July ...	....	135.3	115.0	125.3
Aug. ...	....	139.7	93.4	115.6
Sept. ..	....	147.8	113.6	117.0
Oct. ...	....	145.2	128.8	108.9
Nov. ...	....	126.8	122.3	104.5
Dec. ...	....	123.1	135.2	87.7
Avg ...	....	135.4	114.5	128.9

n.a.=not available.
Machinery Dealers National Assn.



	Net Orders 1960	Net Orders 1959	Shipments 1960	Shipments 1959
Jan.	3,258	2,396	1,582	1,427
Feb.	3,732	2,457	2,563	1,889
Mar.	2,653	2,811	3,011	2,179
Apr.	....	2,258	....	2,193
May	....	2,407	....	2,019
June	....	2,597	....	2,702
July	....	1,980	....	2,289
Aug.	....	2,322	....	2,928
Sept.	....	2,435	....	2,113
Oct.	....	2,599	....	2,097
Nov.	....	2,131	....	1,597
Dec.	....	2,768	....	2,353
Totals ...	....	29,161	....	25,766

Resistance Welder Manufacturers' Assn.

tools came to $12.2 million, or 24 per cent of total new orders for that category. The National Machine Tool Builders' Association points out that in the last six months, foreign orders have accounted for 21 per cent of all cutting tool business, considerably higher than the portion for any of the last five years. NMTBA reports that orders for both cutting and forming tools in March totaled $61 million compared with $60.6 million in February.

• Business for the industrial supply industry also stood still in March. The American Supply & Machinery Manufacturers' Association Inc. says its new order index stood at 199 (July, 1948=100), just 1 point down from the February level.

• Dealers of used machine tools found business slack at the end of the first quarter. For March, the index of the Machinery Dealers National Association dipped to 117.8 (1947-49=100). (See graph and table above.)

• Makers of resistance welding equipment, who had marked up gains for three months in a row, fell off the pace in March. But new orders were still better than for all but two months of 1959. Shipments passed the $3 million mark for the first time since July, 1957. (See graph and table above.)

• Sales of gears, which usually run ahead of general industrial production, slipped in March to the lowest point since last November. At 231.8 (1947-49=100), the monthly booking index was 16 8 per cent below the February reading, states the American Gear Manufacturers Association. However, shipments advanced to 244.6 (1947-49=100), just a shade below the 1959 high set in December.

Buyers Note Decline

Business in April declined for the fourth straight month in the diversified Cleveland area, declares the Purchasing Agents Association of Cleveland. The association reports a statistical deterioration of new orders and production but declares that the dropoff is not of major proportions. Its reporting members continue to view 1960 as a good, though intensely competitive, year. "Thus far, nothing startling has occurred which would indicate the second quarter to be anything other than average," the report concludes.

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- Sintering
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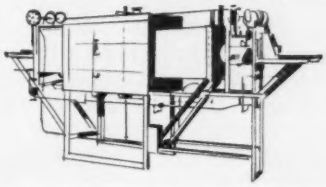
- Heat Treating Exotic Metals

A Compact, Economical-to-Operate Unit featuring molybdenum-wound elements . . . the Hayes Type M-Y Furnace is ideal for high-temperature, close-tolerance work requiring uniform heats from 2700° to the 3300° F. range.

For Research or Production, versatile Hayes Type M-Y furnace is ready-built for a variety of reducing, non-oxidizing, or inert atmospheres . . . dry forming gas, dissociated ammonia, hydrogen, nitrogen, or argon. M-Y features include: (1) moly-wound muffle for maximum length of temp. uniformity, (2) water-jacketed cooling sections

HAYES TYPE M-Y "MOLY" FURNACE



with precise temp. regulators for optimum control of atmosphere cooling, (3) extended insulated throat areas to minimize thermal shock, (4) special atmosphere arrangements to obviate atmosphere contamination, and (5) automatic feed mechanisms.

Results Guaranteed! The Hayes answer to your high-temperature heat treating problem — whether it involves *ceramics, electronics, or metallurgy* — includes *customized* techniques, correct placing and fixturing of work, proper atmosphere selection, and precise time-temperature cycles. To improve your product, increase production, and reduce costs, do it the Hayes way.

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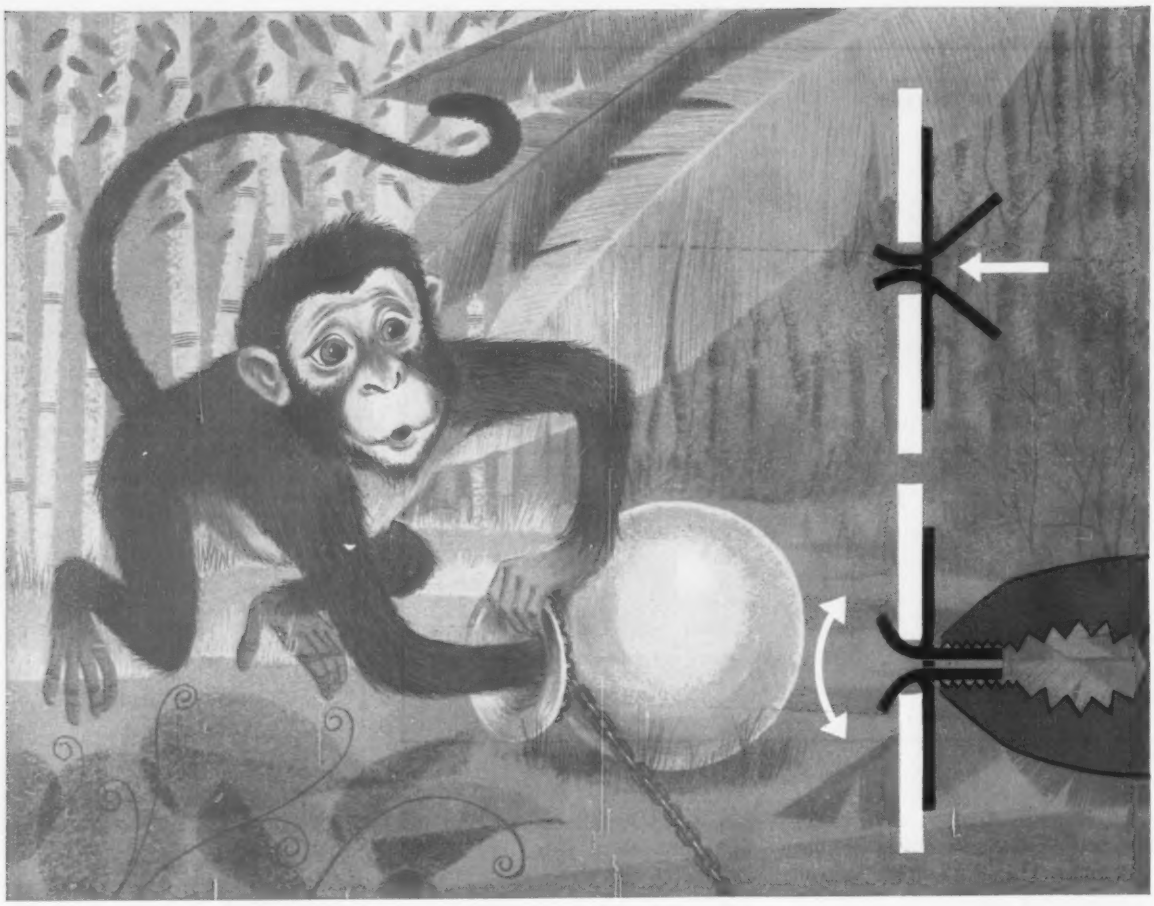
It pays to see Hayes for metallurgical guidance, lab facilities, furnaces, atmos. generators, gas/liquid dryers.



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See how Tinnerman "pinch-grips" hold front-mounting attachments; no special equipment needed

Typical of Tinnerman *new approaches to old problems* are "pinch-grip" SPEED CLIPS—permitting front-of-panel applications in a second's time. SPEED CLIPS are simply inserted into mounting holes and a plier's pinch gives permanent retention.

SPEED CLIPS can increase production rates, eliminate rejects, cut assembly costs as much as 50%. Many different features may be incorporated in the SPEED CLIP design to fasten cables, wire harness, rubber feet, mouldings, and for scores of other assemblies.

You may have a fastening problem that can be solved—or a product which can be improved—by this SPEED CLIP principle. Your Tinnerman specialist (see the Yellow Pages) can furnish samples and help you in many ways. Or write:

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***Speed Nuts*®**

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G. BARRON MALLORY
P. R. Mallory pres.

CHARLES M. BEEGHLY
J&L president

J. ROY GORDON
Inco president

CARL E. WIDELL
Wagner Electric v. p.-marketing

G. Barron Mallory was elected president, **P. R. Mallory & Co. Inc.**, Indianapolis, succeeding **Joseph E. Cain**. **Philip R. Mallory** was re-elected chairman with Mr. Cain elected co-chairman and also chairman of the executive committee to succeed **J. F. Riley** who remains a member of the executive committee. Mr. Mallory has been administrative vice president since 1958.

Charles M. Beeghly was elected president of **Jones & Laughlin Steel Corp.**, Pittsburgh. He served as executive vice president. **Avery C. Adams**, former chairman and president, will continue as chairman and chief executive officer.

L. John Harwood was appointed sales manager by **Alloy Steel Casting Co.**, Southampton, Pa. Previous foundry experience was with Electro-Alloys Div. of American Brake Shoe Co., and Midvale Co.

John M. Curley Jr. was elected vice president and assistant to the president of **Eastern Stainless Steel Corp.**, Baltimore. He is also executive vice president of Industrial Stainless Steels Inc., subsidiary at Cambridge, Mass.

Andrew J. Waitkins was promoted to chief engineer at **Fabri-Tech**, subsidiary of F. Jos. Lamb Co., Detroit.

Myron L. Chase was elected vice president in charge of scrap exports for **Luria Bros. & Co. Inc.**, New York, division of Ogden Corp. He was assistant to the president.

J. Roy Gordon was elected president, **International Nickel Co. of Canada Ltd.**, Copper Cliff, Ont. Former executive vice president, he succeeds **Henry S. Wingate**, elected chairman and chief officer of the company. **Ralph D. Parker**, vice president in charge of Canadian operations, was elected senior vice president. Mr. Wingate succeeds **Dr. John F. Thompson** who becomes honorary chairman and continues to serve as chairman of the executive committee.

J. M. Minore was elected vice president and general manager, **North American Refractories Ltd.**, Hamilton, Ont., subsidiary of North American Refractories Co. He succeeds **Gordon L. Memory**, retired.

Sharon Tube Co., Sharon, Pa., elected **Robert W. Brown** president; **J. J. Friedman** chairman; **Irwin M. Yanowitz** vice president-treasurer; **Charles A. Spencer** secretary-comptroller.

William G. Miller was elected a vice president of **Alco Products Inc.**, Schenectady, N. Y. He has been president of the Canadian affiliate, Montreal Locomotive Works Ltd. He now directs Alco's foreign sales and overseas activities.

Robert P. Piekarski succeeds **Frederic A. Fischer**, retired, as manager of **National Can Corp.'s** plant at Hamilton, Ohio.

John P. Vederko was made vice president and general manager, **Douglas Tool Co.**, Detroit, affiliate of Pioneer Engineering & Mfg. Co.

Carl E. Widell was elected vice president-marketing, **Wagner Electric Corp.**, St. Louis. He succeeds **Harold N. Felton** who remains with the company as a vice president in an advisory and consulting capacity.

George J. Fehrenbach, executive vice president, was elected president and chief administrative officer of **Speer Carbon Co.**, St. Marys, Pa. He succeeds **Andrew Kaul III** who was elected chairman and continues as chief executive officer. **William E. Hall**, former chairman, was named chairman of the executive committee.

N. Keith Demmon was named manager for the manufacturing organization of **National Carbon Co.**, division of Union Carbide Corp., New York.

Hugh J. Morrison succeeds **John L. Patterson** as general manager, Fabricating Div., **Aluminum Co. of America**, Pittsburgh. **John D. Harper**, former general manager, Smelting Div., and **George W. Streepey**, general manager, Raw Materials Div., were named assistant production managers. Mr. Harper is responsible for smelting and fabricating divisions; Mr. Streepey for raw materials and refining divisions.

Clarence Mark Jr. was elected to the new post of executive vice president, **Clayton Mark & Co.**, Evanston, Ill.

George A. Jones was appointed general manager of **Colson Corp.'s** Jonesboro, Ark., plant. He was general manufacturing manager of

BYRON K. HARTMAN
Syntron president

THOMAS M. ELLIOTT
Heppenstall plant supt.

EUGENE MAKIE
Natco v. p.-mfg.

JAMES L. WOODLEY
Hyster promotion

General Steel Wares Co. in Canada.

Byron K. Hartman succeeds **Carl S. Weyandt,** retired, as president of **Syntron Co.,** Homer City, Pa. Mr. Hartman joined the company last August as executive vice president and general manager. He was sales manager of the Colmar, Pa., plant of Link-Belt Co.

Thomas M. Elliott was appointed superintendent of the Pittsburgh plant of Heppenstall Co. He was assistant industrial relations director.

Link-Belt Co. named **Edward L. Mills** to succeed **David W. Stevens,** retired, as district manager at Huntington, W. Va., and **Earl W. Habberstad** to succeed Mr. Mills as district manager at Duluth.

F. A. McClelland was elected vice president - sales, **Wheeling Steel Corp.,** Wheeling, W. Va. Appointed general manager of sales in January, 1959, he continues in that position, directing over-all sales and commercial activities.

Eugene Makie was appointed vice president - manufacturing, **National Automatic Tool Co.,** Richmond, Ind. He replaces **A. B. McCrea,** appointed to the new post of vice president-finance. Mr. Makie was general manufacturing manager, Utica Div., Curtiss-Wright Corp., Detroit.

A. S. Glossbrenner, president, **Youngstown Sheet & Tube Co.,** Youngstown, was named chief executive officer, former responsibility of **J. L. Mauthe** who remains as chairman.

Bridgeport Brass Co., Bridgeport, Conn., named **Anthony J. Malisek,** former director of purchases, to vice president-procurement; and **Frank J. Cowley,** former general superintendent of the Indianapolis plant, to plant manager of that facility.

A. H. Schott was elected vice president, **Ohio Crankshaft Co.,** Cleveland. He continues as general manager of the Crankshaft & Camshaft Div. which he has directed since 1956.

James L. Woodley, for the last five years manager of **Hyster Co.'s** Danville, Ill., plant, was placed in charge of company-wide manufacturing activities. He is replaced at **Danville by William H. Kilkenny,** former manager of Hyster retail operations in Los Angeles. **Harold Berg** replaces Mr. Kilkenny.

Thomas V. Jones, president of **Northrop Corp.,** Los Angeles, since 1959, was named chief executive officer.

Robert J. Noonan was made production supervisor, Electronics Div., **American Tube Bending Co.,** New Haven, Conn. The division was formed recently to distribute and fabricate Phelps Dodge coaxial cable sold to aircraft, missile, and general communications fields.

Lawrence G. Maechtlen, executive vice president, **Square D Co.,** Detroit, was elected president to succeed **Gordon Patterson,** resigned.

Robert E. Groening was made gen-

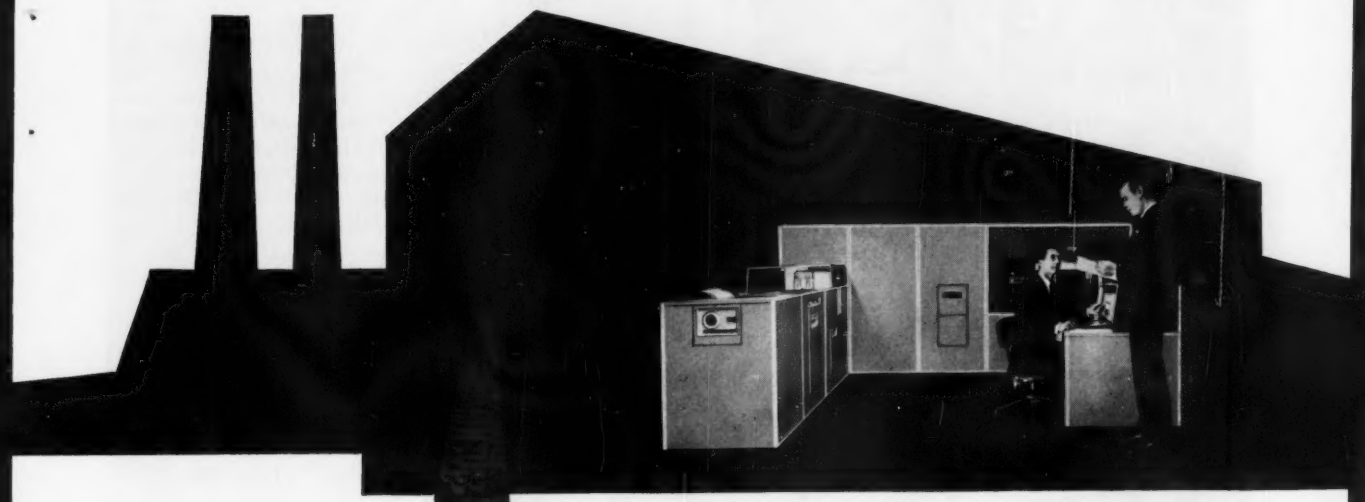
F. A. McCLELLAND
Wheeling Steel v. p.-sales

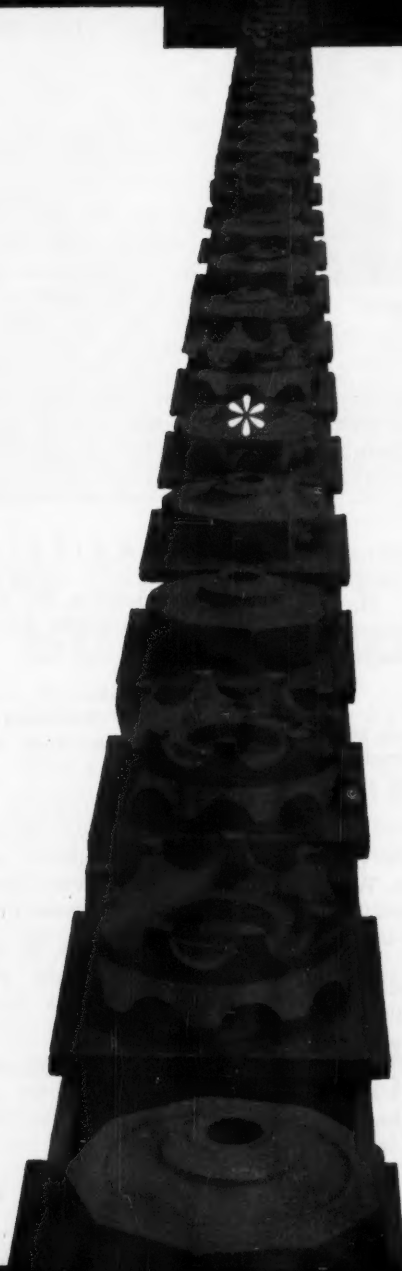
ANTHONY J. MALISEK
Bridgeport Brass v. p.

A. H. SCHOTT
Ohio Crankshaft v. p.

LAWRENCE G. MAECHTLEN
Square D president

one late decision on inventory and this $50 part* could cost you $5,000





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JOHN R. BARTIZAL
Clearing Div. president

ROBERT O. BULLARD
heads B-L-H div.

J. S. ROSS
A. O. Smith post

IDEN F. RICHARDSON
Hughes Aircraft v. p.

EDWARD E. KIRKHAM
P&W chief eng.-Machinery Dept.

PAUL G. FRERER
Dura engineering dir.

eral sales manager, **United Welders Inc.**, Bay City, Mich.

Iden F. Richardson was appointed a vice president of **Hughes Aircraft Co.**, Culver City, Calif. He continues as manager of commercial products activities, a post to which he was named last October. He previously served Bendix Aviation Corp. for 23 years.

Punch Products Corp., Buffalo, appointed **Rocco L. Stefano** general manager; **Ralph L. Weisbeck** sales manager.

Lawrence J. Smith was appointed vice president-research, **Bell & Gossett Co.**, Morton Grove, Ill.

Charles J. Kremer Jr. and **Richard W. Hoyt** were promoted to vice presidents of **C. Lee Cook Co.**, Louisville, division of Dover Corp. Mr. Kremer is in charge of engineering. He was chief engineer. Mr. Hoyt, former assistant to the president, is now in charge of the Airtomic Products Div.

Edward E. Kirkham, chief development engineer at **Pratt & Whitney Co. Inc.**, West Hartford, Conn., was named chief engineer, Machinery Engineering Dept.

Paul G. Frerer was appointed director of engineering for **Dura Corp.**, Oak Park, Mich. He was co-ordinator of engineering at Cherry-Burrell Corp., Cedar Rapids, Iowa.

Joseph A. Wiendl was made general manager of sales, **Ingersoll-Rand Co.**, New York. He was assistant general sales manager.

L. A. Brewer fills the new post of manager of strubing sales, **Wolverine Tube Div.**, Allen Park, Mich., Calumet & Hecla Inc.

Donald Henry was named assistant general manager of **Rockwell Mfg. Co.'s** Bellefontaine, Ohio, power tool plant. He joined the plant last June. He previously was assistant plant manager for Yuba Power Products Inc.

John R. Bartizal was elected president of **Clearing Div.**, Chicago, U. S. Industries Inc. He returns to Clearing after an absence of about six years. Previously with the company for ten years (through 1954), he was executive vice president. When Clearing was acquired by U. S. Industries in 1954, Mr. Bartizal resigned to become chairman and president of **Benjamin Electric Mfg. Co.**, a post he held until December, 1958. He most recently was president of Schoolco Inc.

Robert O. Bullard was elected vice president and general manager, Electronics & Instrumentation Div., **Baldwin - Lima - Hamilton Corp.**, Waltham, Mass. He was general manager, Power Tube Dept., General Electric Co.

J. S. Ross fills the new post of manager of production and material control, Automotive Div., **A. O. Smith Corp.**, Milwaukee.

Harry A. Zaruba was made manager of the Cleveland plant of **Le-Roi Div.**, Westinghouse Air Brake Co. He was manager of manufacturing of the Cleveland plant for two years before moving to the Le Roi operation in Milwaukee to become shop superintendent last May. He was promoted in October to manager of manufacturing.

OBITUARIES...

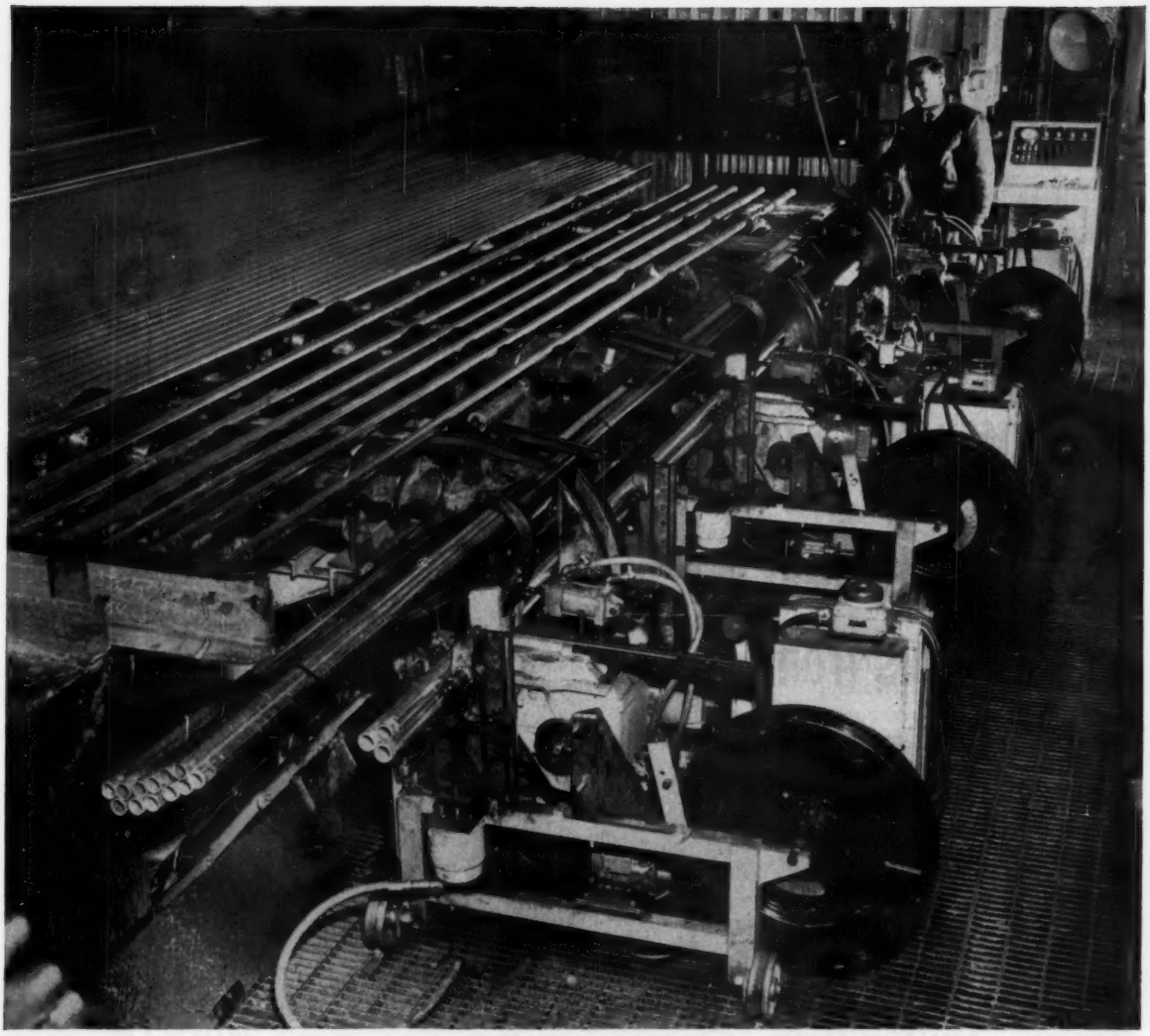
S. W. Kirchmeyer, 64, purchasing agent, **Hewitt-Robins Inc.**, Buffalo, died recently.

W. A. Whittaker, 67, assistant to the president, **Anaconda Wire & Cable Co.**, New York, died Apr. 25.

Alvin D. Johnston, 42, assistant sales manager, bolt products, and manager of railroad sales for **Sheffield Div.**, Armco Steel Corp., died Apr. 17 in Kansas City, Mo.

William M. Buttriss, 52, director of advertising and sales promotion, **Tinnerman Products Inc.**, Cleveland, died Apr. 4.

Frederick Blume Jr., 55, manager of national accounts for container sales, **Rheem Mfg. Co.**, New York, died Apr. 26.



Courtesy of Blaw-Knox Company, Aetna-Standard Division

New Signode machines bundle pipe in seconds

Three synchronized Signode Model MS2BR power strapping machines are at work here. They automatically apply three straps per bundle. With these machines, it is now possible to keep ahead of the production of high speed pipe mills. Uniformly tight bundles are produced.

Similar Signode power strapping machines for pipe bundling have been proved dependable in more than six years of pipe mill service. They are ideal for strapping electrical metallic tubing and rigid conduit, as well as pipe. Write for more information about these machines or this installation. Signode counsel is available to help you work out a strapping installation that meets your requirements, no matter what your product. No obligation. Just write:

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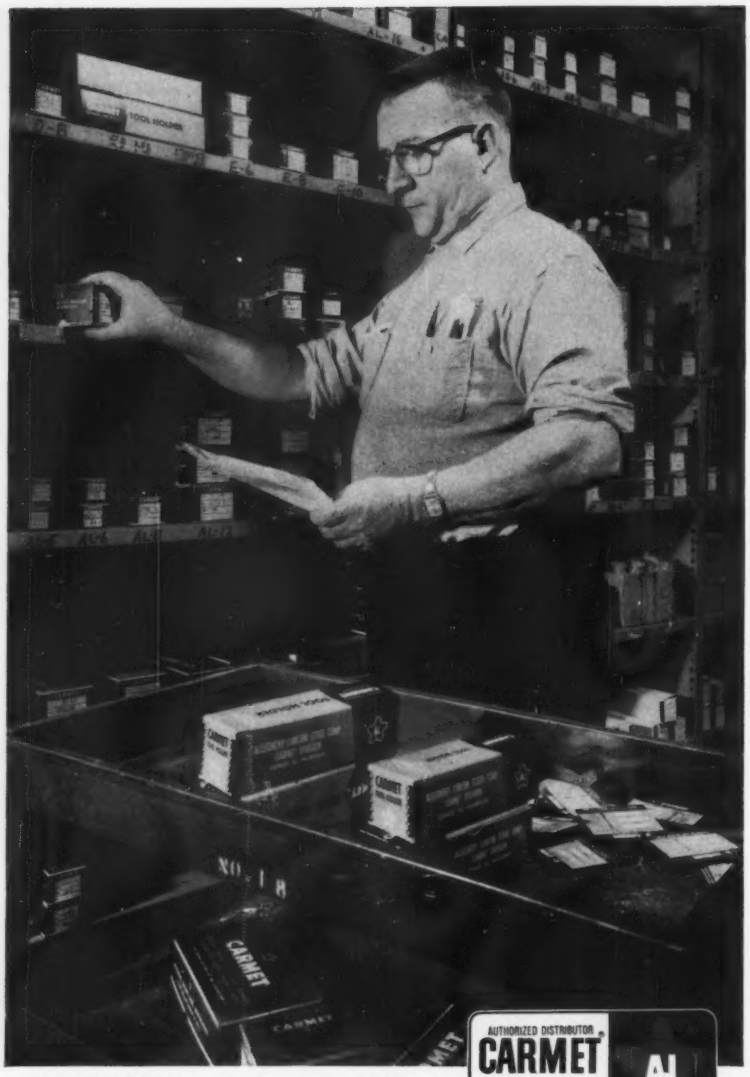
Off-the-shelf delivery of Carmet® Carbide Tools from your local CARMET Distributor



Over 75 distributors, coast to coast, display this sign—service in your own local area.

Keep your inventory of Carmet Carbide Tools at a comfortable level. Keep your working capital free for other needs. Your Carmet distributor carries the load—that's how he's set up to do business.

He carries your needs from the complete line of Carmet Carbide Tools in all grades and every style. He is geared to deliver your orders quickly—a phone call gets action.

And if you get in a production jam, special service is his middle name. Remember, your Carmet distributor knows carbide tooling—with the help of the local Carmet technical man, you get all the help you need.

Your Carmet distributor handles the best Carbide Tools and backs it with the best service! ***Allegheny Ludlum Steel Corporation, Carmet Division, Ferndale, Detroit 20, Michigan.***

CARMET® AL

CEMENTED CARBIDE • DIVISION OF ALLEGHENY LUDLUM

1300

Inland Steel Dedicates Canadian Mining Project

CALAND ORE CO. LTD., a subsidiary of Inland Steel Co., Chicago, expects to ship 750,000 tons of ore this year from its mining operation near Atikokan, Ont. When capacity operations are reached by 1969, Caland will supply one-third of Inland's iron ore needs, making it the steel company's largest single source for this raw material.

Speaking at ceremonies dedicating the facility, Joseph L. Block, chairman of Inland, described the occasion as the start of the company's second largest project. (The first: Its main steel works at Indiana Harbor, Ind.) "Here we have made an investment of about 10 per cent of our total capital resources," Mr. Block said. He added that his company will have spent about $66 million in wages and materials purchased in Canada when the project is completed.

• **Imports to Soar**—Referring to the importance of Canadian ore to the American steel industry, he pointed out that in 1950 less than 2 million tons of it were consumed by American steel companies. Last year, 12 million tons were shipped to American steel mills, despite the lengthy strike. America's use of Canadian ore has jumped from 1.8 per cent to 13.4 per cent during the 1950-59 period.

"Experts estimate that two decades hence the annual tonnage will be between 30 million and 40 million tons," Mr. Block added.

Development of the property started in 1953 when Inland leased an ore body beneath the waters of the eastern arm of Steep Rock Lake from Steep Rock Iron Mines Ltd. Over a five year period, 160 million cu yd of silt overlying the ore body was transferred overland to another lake. Caland is currently mining iron ore by the open pit method. Underground development is already far along. Such mining will start in 1963. Peter P. Ribotto, vice president of Caland, directs the company's operations in Canada.

Metal Firms to Merge

Merger of Minerals & Chemicals Corp. of America, Menlo Park, N. J., Philipp Bros. Inc. and Philipp Bros. Ore Corp., New York, has been approved by their respective directors.

Minerals & Chemicals is a producer and processor of clays, activated bauxite, and limestone products. Philipp Bros. Inc. and its subsidiary, Philipp Bros. Ore Corp., are importers, exporters, processors, and merchants in ferrous and nonferrous ores, metals, and minerals.

Officers of the merged corporation, Minerals & Chemicals-Philipp Bros. Inc., will be: Chairman, James Deshler; vice chairman, Siegfried Ullmann; president, C. A. Specht; executive vice presidents, Ludwig Jesselson and A. G. Blake; and senior vice president, Leo Forchheimer.

Motorola Plans Expansion

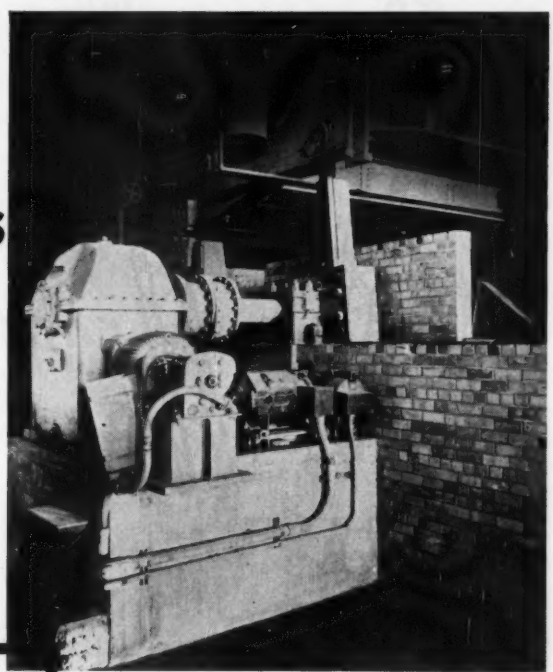
Motorola Inc., Chicago, plans to spend $1 million in the next two years for expansion of its plant in Arcade, N. Y. Work will begin soon on a 30,000 sq ft addition to the building.

Ellicott Acquires Plant

Ellicott Machine Corp., Baltimore, acquired the plant of Charles T. Brandt Inc., that city. It will be operated by Ellicott-Brandt Inc., a wholly owned Ellicott subsidiary. The Brandt firm produces pressed shapes, medium to heavy weldments, stampings, architectural metal products, and various ordnance components and assemblies. Facilities are being expanded by the ad-

(*Please turn to page* 128)

Tilting 700-tons of steel furnace



CONE-DRIVE GEARS

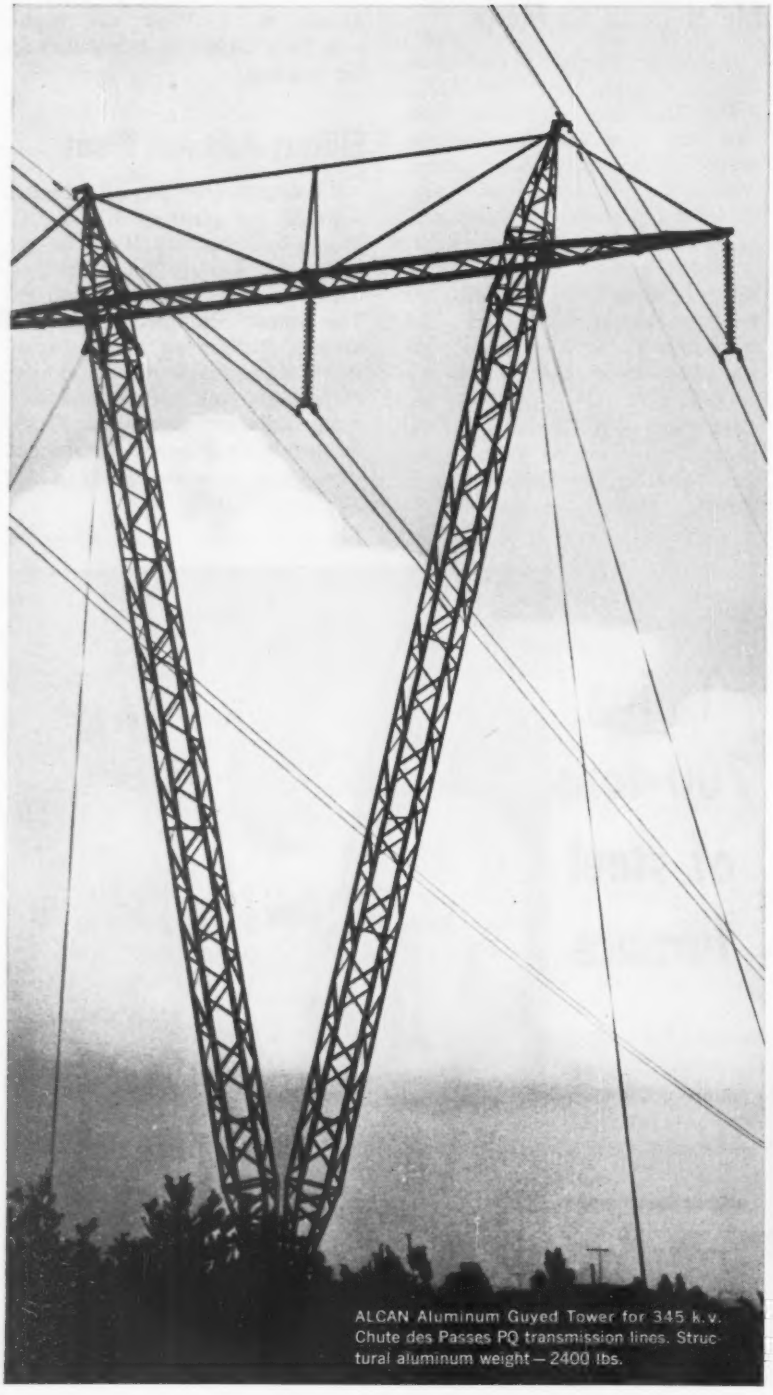
DIVISION MICHIGAN TOOL CO.
7171 E. McNichols Rd., Detroit 12

Here's a closeup of tilting mechanism for an electric furnace. Standard, stock model, double-reduction Cone-Drive **double-enveloping worm** gear speed reducer tilts furnace and heat with combined weight of 700 tons.

Powerful Cone-Drive gearing is available in gearsets, speed reducers and gearmotors.

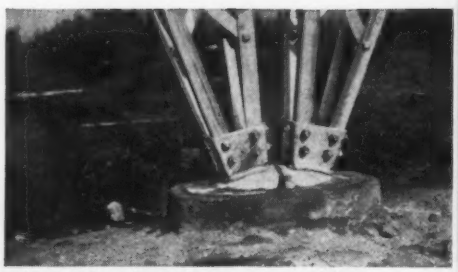
From Aluminium Limited research—an important

The ALCAN



ALCAN Aluminum Guyed Tower for 345 k.v. Chute des Passes PQ transmission lines. Structural aluminum weight—2400 lbs.

- Designed for installation on level ground . . . mountain or in swamp
- Weight savings of up to 80% due to the combination of efficient aluminum design and the guyed-tower principle
- Lightweight components are readily transported by panel truck, motorboat, helicopter . . . easily carried by hand
- Tower can be raised by one crew in minutes!
- Offers all the maintenance economies of aluminum



When used in the "V" arrangement only one footing and four inexpensive guy anchorages are required—eliminating the need for precision in footing work. Side-hill problems of leg extensions are nonexistent.

new application for aluminum extrusions

Aluminum Guyed Tower

—a revolutionary new high-voltage transmission structure that "makes molehills out of mountains"

The ALCAN Aluminum Guyed Tower brings substantial economies to the construction of high-voltage transmission lines.

The new unit—designed for "V" or parallel leg erection—has been created by ALCAN engineers to take full advantage of aluminum. The resulting combination of lightweight metal and the guyed-tower principle has many advantages over rigid conventional types.

Versatile Application

Particularly well suited for single-circuit lines, the ALCAN Guyed Tower is adaptable to all types of terrain without the additional costs normally expected with adverse footings and side-hill conditions.

Economical Installation

A primary advantage of the new tower is a weight reduction of up to 80% less than the rigid steel principle. This results in lower installed costs through lower transportation expenses . . . lighter erection equipment . . . simpler footing alignments . . . reduced erection time.

Easily Handled

All ALCAN Guyed Tower components can be delivered to the erection site with no need for special carriers or heavy lifting gear. Lightweight 20-foot leg sections weighing less than 200 pounds and major cross-arm pieces are readily handled by workmen without need for auxiliary equipment. This permits inexpensive yard assembly of a major portion of the tower before distribution to the tower sites.

Simple Assembly

Depending on the height required, only six to ten standard leg sections and a cross-arm go to make up each tower . . . sections can be quickly joined during ground assembly of units.

Single or Twin Base Erection

The ALCAN Aluminum Guyed Tower can be erected on a single base in the form of a "V" or on twin bases as a portal type, whichever style best suits conditions of terrain and right of way.

Fully Tested Design

Ultimate load tests on components as well as on complete towers have been carried out to establish the behavior of this arrangement and to confirm design principles. Special footings and guy anchorages located in marshland, loose sand, packed earth and rocky terrain have also been tested to full design loadings.

This development and test program resulted in the installation of four guyed towers in the ALCAN 345 k.v. Chute des Passes transmission system. Ranging from 76 feet to 96 feet from base to cross-arm, two are located on rock and two were installed in a swamp.

Uses Special High-Strength Alloy

The new ALCAN Guyed Tower is made of another Aluminium Limited development—ALCAN B51S aluminum alloy, which keeps costs low through a combination of high structural strength and good formability. Like all aluminum structures—maintenance costs are minimum.

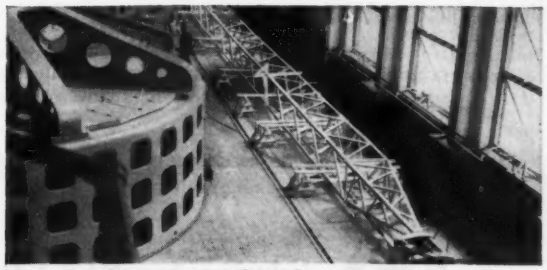
Aluminium Limited ALCAN

INQUIRIES FOR ADDITIONAL INFORMATION SHOULD BE ADDRESSED TO

Aluminium Limited Sales, Inc.—630 Fifth Avenue, New York 20, N. Y.

CLEVELAND • CHICAGO • LOS ANGELES • DETROIT • ATLANTA • ST. LOUIS

ALCAN Aluminum Guyed Towers over 100 feet in height have been raised in less than seven minutes from preassembled position on ground using standard pole-line truck and rigging. In rough terrain tower can be erected in large lightweight sections.



ALCAN Guyed Towers were subjected to tests by Aluminium Limited at Isle Maligne, Quebec, Powerhouse, with single legs up to 96 ft. in length, under loads of 93,000 lbs.

How to buy steel rings . . .

consult with experienced maker

Find out about his background . . . experience . . . manufacturing facilities . . . how close he can come to meeting your specifications . . . what engineering assistance he can provide.

put your plans in his hands

When you have found this experienced, reliable supplier, send him your drawings. Give him complete details on materials, shape, tolerances you require, nature of application, and the performance you expect.

then let him assist you

If Edgewater is your choice, you will find that we will follow your specifications exactly. If required, we can furnish engineering assistance and suggest the material, shape and size to give you the ultimate in performance and economy.

want more details? Write for the Edgewater brochure, which describes our facilities, know-how, and range of sizes and shapes.

Edgewater Steel Company

P.O. Box 478 • Dept. S • Pittsburgh 30, Pa.

(*Concluded from Page* 125)

dition of a 30 ft press brake to accommodate the growing market for single piece, formed shapes of extended length.

Blaw-Knox to Modernize

Blaw-Knox Co., Pittsburgh, is planning a modernization program estimated to cost between $12 million and $15 million. The program will be centered largely in major properties serving the metallurgical industries.

Harvey Aluminum Expands

Harvey Aluminum, Torrance, Calif., is expanding its aluminum reduction capacity by 25 per cent and making substantial additions to its fabricating facilities. The new facilities consist of billet casting, wire rod, and related equipment being installed at The Dalles, Oreg., plant and a merchant bar mill and conduit facilities being constructed at Torrance.

Builds Research Center

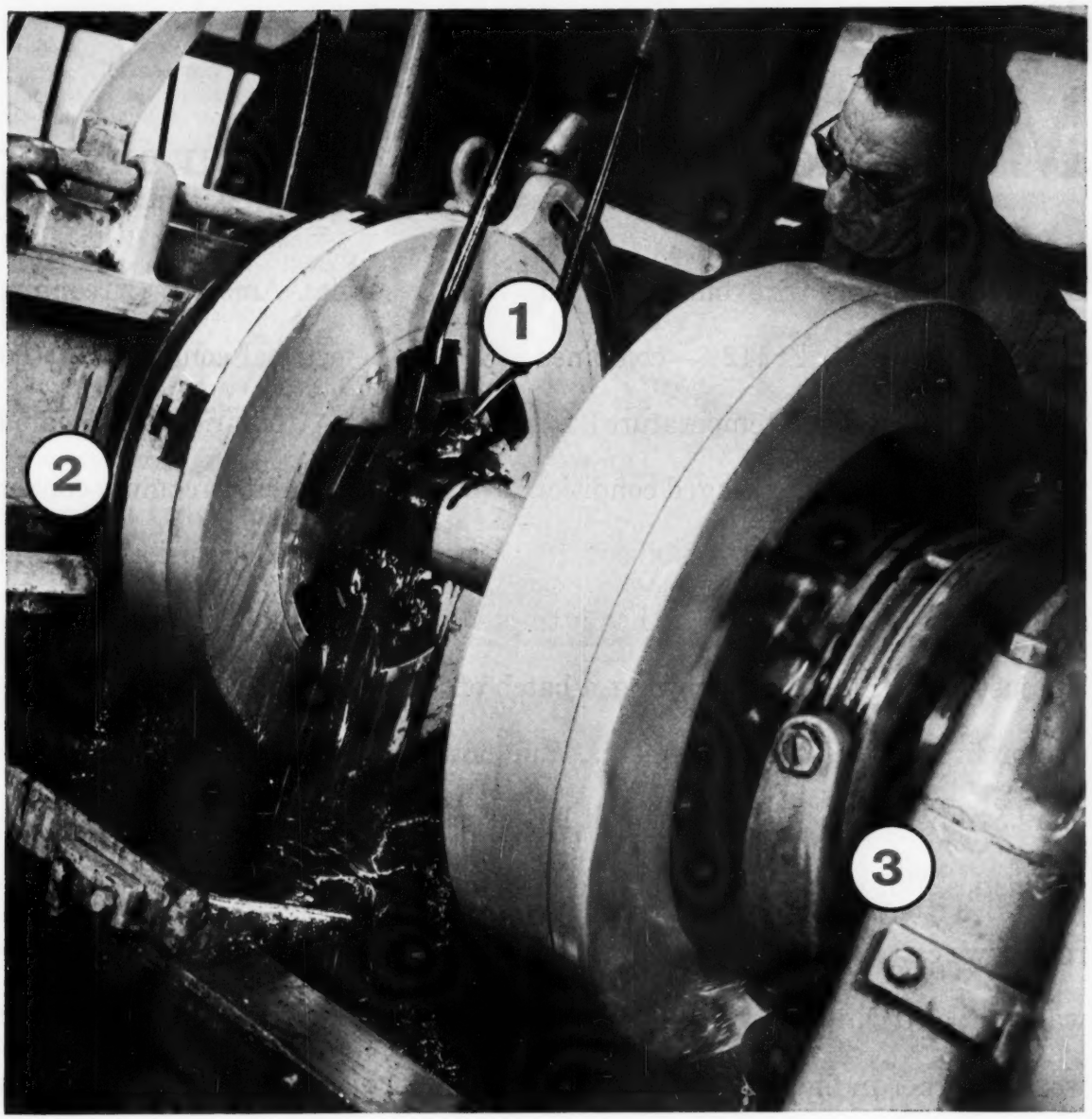
American Brass Co., Waterbury, Conn., has started construction of a 50,000 sq ft research and technical center scheduled for completion early next year. Estimated cost: $1.5 million.

Honeywell Boosts Output

Brown Instrument Div., Minneapolis-Honeywell Regulator Co., Minneapolis, has expanded facilities for production of thermocouple and other pyrometer supplies. Operations in Philadelphia have been streamlined and moved to new quarters. In Los Angeles, assembly and stocking of the products are being carried out in a new plant.

Zircoa Enlarges Facilities

Zirconium Corp., of America, Solon, Ohio, has completed an accelerated construction program. A new 8000 sq ft building is available for the manufacture of high temperature refractory materials. The facility includes a new kiln area and a fabricating section which contains standard ceramic fabrication processes, including dry pressing, ramming, extruding, slip casting, iso-



ESSO LUBES HELP BOOST CUTTING EFFICIENCY

1. PENNEX® cutting oils, compounded with fatty materials, are widely used to boost cutting efficiency in threading, tapping and other machining operations on ferrous metals. Featuring high sulfur activity which provides excellent surface finish and low tool wear, Pennex cutting oils have been proven performers over many years.

2. NUTO® hydraulic and circulating oils are inhibited for oxidation and rust protection. They resist foaming and have a high viscosity index for hydraulic uses. They also serve efficiently in gear drives, bearings, and circulating systems.

3. NEBULA® EP multi-purpose grease replaces many single-purpose greases: provides high oxidation stability for long service; lubricates efficiently under high temperature conditions; serves *all* grease-lubricated points, including those where extreme-pressure properties are required.

For further information about Esso lubricants, contact your local Esso office or write: Esso Standard, Division of Humble Oil & Refining Company, 15 West 51st Street, New York 19, New York.

Esso

In Industry after Industry..."ESSO RESEARCH works wonders with oil"

Anaconda Memo to Management

Maybe zirconium copper wire is your answer

Looks like ordinary wire, but it's new and rather special. Amzirc®—zirconium copper, Cu 99.88%, Zr .12%—combines high electrical conductivity (90 to 95% IACS at room temperature) and strength retention at elevated temperature in the aged condition. Tensile strength of zirconium copper cold worked 80% and aged is about 70,000 psi at 20 C—52,000 psi at 400 C in a short-time test. Naturally, it has attracted interest in the missile field. We just recently finished drawing a batch of .0179″ wire for testing as a conductor in some missile components, and now know that even smaller diameters can be made. We also know it has excellent hot- and cold-working characteristics. But we don't have all the answers yet—nor does anyone else. The reason we call it to your attention is that you may have a problem that won't wait until we can it as a completely proven product. Possibly we could work together in finding the answer. Our Metallurgical Department and mills are working with many copper alloys offering a variety of unusual property combinations. The answer might be Amzirc—or *Cunisil-837*, our copper-nickel-silicon alloy—or *Chromium Copper-999*—or *Leaded Nickel Copper-831*. All have a potential for special electrical applications.

6046

If you are looking for metals to do new jobs—or to do present jobs better—tell us the combinations of properties you need. Call in your American Brass Company representative or write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

ANACONDA®

COPPER · BRASS · BRONZE · NICKEL SILVER MILL PRODUCTS

Made by The American Brass Company

static pressing, and precision machining. A process is being added to specially size powder materials for use in high temperature coatings as applied by flame spray and arc plasma equipment.

Installs Blooming Mill

Acme Steel Co., Chicago, installed a 32 in., two high, reversing blooming mill as part of the recently completed steelmaking facilities at its Riverdale, Ill., plant. The mill stand and its associated handling equipment were designed and built by Birdsboro Corp., Birdsboro, Pa. The mill rolls a broad range of products from large blooms to small billets.

Aluminum Foils Expands

Aluminum Foils Inc., Jackson, Tenn., has nearly completed construction of a 13,500 sq ft addition to its superpurity aluminum plant. The expansion will more than double capacity to produce aluminum with a guaranteed minimum purity of 99.992 per cent. Over-all cost: About $500,000.

REPRESENTATIVES

Wayne N. Vanderhoof has been named president of **Interstate Abrasives Inc.**, Chicago, newly organized distributor for Peninsular grinding wheels serving a large part of Chicago and adjacent areas. Mr. Vanderhoof has had considerable experience as sales engineer for grinding wheels in the St. Louis, Pittsburgh, and Chicago areas.

Chicago Steel Service Co., Chicago, has been appointed a distributor of nickel alloys from **Riverside-Alloy Metal Div., H. K. Porter Company Inc.**, Riverside, N. J.

Brice Machinery & Controls Co., Houston, has been appointed sales representative by **Allis-Chalmers Mfg. Co.**, Milwaukee, for industrial machinery and control equipment made by the firm.

Ducommun Metals & Supply Co., Los Angeles, has been appointed a distributor for **Rodney Metals Inc.**, New Bedford, Mass., in California,

(*Please turn to Page* 134)

For a pre-cleaning short-cut to better plating

ask Oakite

OVER 50 YEARS CLEANING EXPERIENCE • OVER 250 SERVICE MEN • OVER 160 MATERIALS

Now—remove smut, rust and soils with one electrocleaner: Oakite 190

Here is a new reverse-current cleaner that performs two operations at once. (1) It removes the oily soils normally requiring an alkaline cleaner . . . and (2) it removes smut and rust bloom normally requiring additional treatment.

New Oakite 190 performs this double duty because it's a *chelated* detergent. Chelation—which makes metallic salts and oxides soluble in water—handles the removal of smut, heat scale and rust. Powerful alkaline detergency handles the removal of oil films and shop soil. As a bonus, Oakite 190 has high conductivity, rinses well in hot or cold water.

Result: new Oakite 190 insures fewer plating rejects due to inadequate pre-cleaning, *eliminates an entire operating step* in many instances.

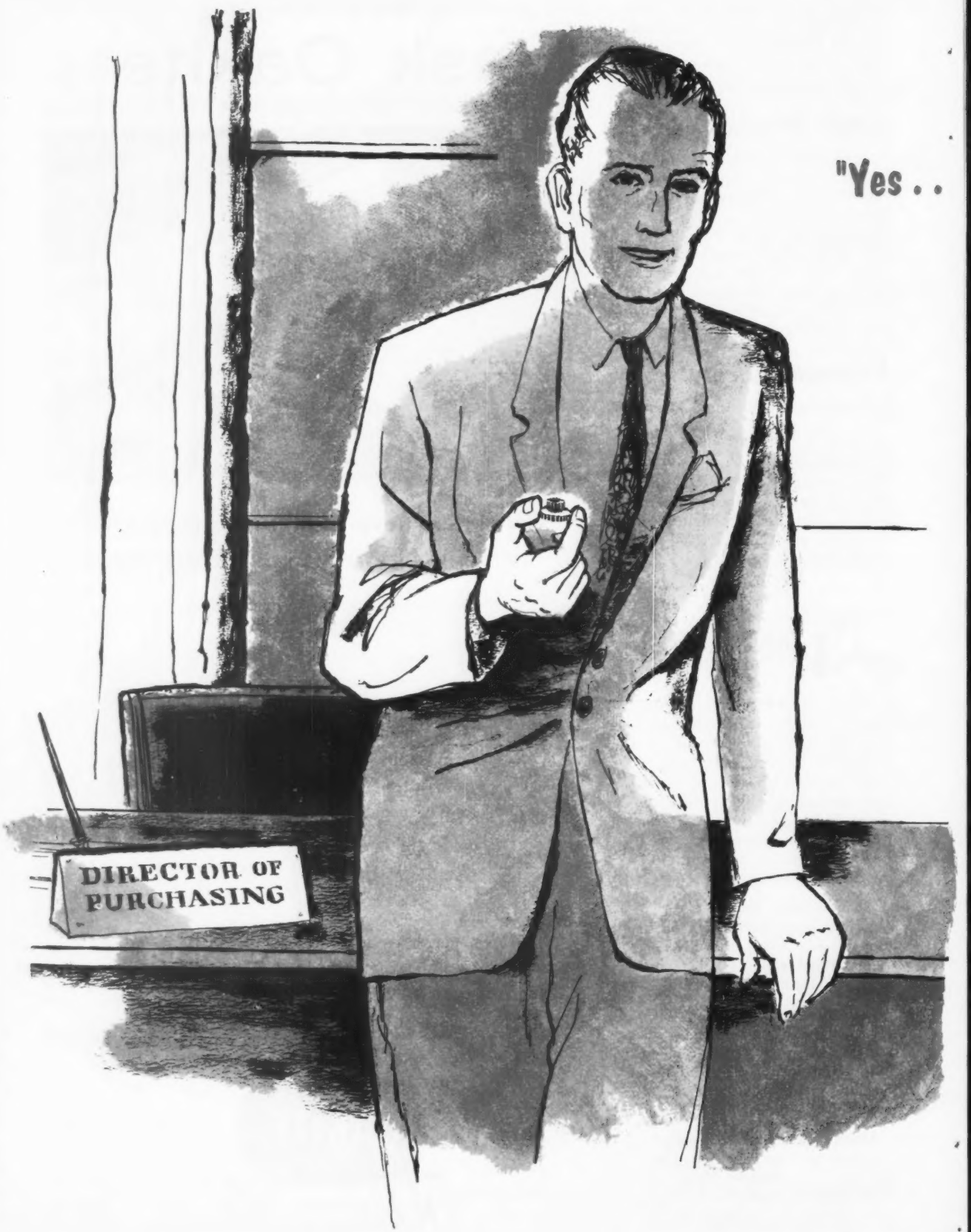
For more details about Oakite 190, ask your local Oakite man or write to Oakite Products, Inc., 25A Rector Street, New York 6, N. Y.

it PAYS to ask Oakite

OAKITE

over 50 Est. 1909 SCIENCE

years' leadership in industrial cleaning


"Yes . .
DIRECTOR OF
PURCHASING

. . We depend on G.S. for our Precision Gearing!"

"It's just a matter of logic—and good business. You see, we produce rather complex mechanisms. They have to hold up under all kinds of tough conditions in the field. And since Precision Gearing is at the heart of our units, that's the one place we have to *know* that the quality and accuracy of components are consistently right.

"G.S. produces our Gearing to close-tolerance specifications—and we've found that their respect for max. and min. is, if anything, even greater than our own. They deliver our Gearing the *same* from run to run, which keeps our production line moving right along—we don't have slow-downs because of Gearing variations. And failure in the field from Gear trouble is almost unheard of; that means a lot in customer satisfaction, not to mention saving servicing or replacement expense.

"Speaking of money, we've found that G.S. keeps us competitive on costs in the broadest sense. They have the equipment, and the experience, to do precision jobs like ours on a production basis—we aren't paying on the "hand-made" scale. Besides, they make *all* the kinds of Gears and Gearing we need—Spurs, Spirals, Bevels, Helicals, Internals, Zerols, Clusters, Ratchets, Splines, Hobbing, Worm Gearing. That simplifies our specifying and buying—and that's worth money, too.

"Just one more thing. When we do have a special or unusual problem about Gearing, either in production or in development of new projects, we've found that G.S. is as close as our phone. We've had their experts in from their factory several times, and their broad, practical experience has been mighty helpful. It's like having extra specialists right on our own staff!

"Yes, *we* depend on G.S. for our Precision Gearing. Why don't *you* talk to them about your Gear problems?"

YOU'LL FIND G.S. GEARING IN TOP QUALITY PRODUCTS LIKE THESE . . .

Adding Machines • Aircraft Carburetors & Fuel Metering Systems • Aircraft Instruments and Radios • Automatic Musical Instruments • Automation Systems • Business Machines • Check Signing & Protecting Machines • Clippers for Barbers, Animal Shearing & Hedge Trimming • Cloth Cutting Machines • Coin Changers & Counters • Communication Equipment • Control Mechanisms • Electric Fans • Electric Motors • Floor Polishers, Sanders, Scrubbers, Sweepers • Food & Drink Mixers, Blenders • Home Appliances • Lawn Sprinklers • Machine Tools • Meat Tenderizers, Grinders, Slicers • Military Equipment • Motion Picture Cameras & Projectors • Optical Instruments • Outboard Motors • Pneumatic Production Tools • Radio & Radar Tuning Assemblies • Radio Anti-backlash Gears • Range Finders • Record Changers • Sewing Machines • Steel Strap Stretchers • Step Switches • Tapping, Drilling & Threading Equipment • Telephone Dials • Television Sets • Thermostatic Controls • Typewriters • Vending Machines • Washing Machines.

SEND FOR G.S. *illustrated folder! See where and how we mass-manufacture Small Gearing to uniformly fine tolerances. Folder contains 23 pictures of Small Gears, plant view, as well as Diametral and Circular Pitch Tables. Ask for your copy on company stationery, please!*

44 Years of Specializing in Small Gearing!

FRACTIONAL HORSEPOWER GEARING

GEAR

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SPURS • SPIRALS • HELICALS • BEVELS • INTERNALS
WORM GEARING • RACKS • THREAD GRINDING

WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARING

when things are HOT... call on Duraloy

A design of the A. F. Holden Co., Detroit, Mich.

Castings that Keep their Load-Carrying Strength at High Temperatures

This "immersion type radiant heater" is typical of the high reliability castings turned out by DURALOY. Centrifugally cast tubes with *UNIFORM* wall thickness...for longest service life. Static cast collars and shell molded bends...typical of DURALOY versatility.

For your high alloy casting requirements check with DURALOY... our long experience, ultra-modern foundry and up-to-the-minute test equipment will be helpful in solving your problems. For more information ask for Bulletin No. 3150 G.

The DURALOY Company
OFFICE AND PLANT: Scottdale, Pa.
EASTERN OFFICE: 12 East 41st Street, New York 17, N. Y.
CHICAGO OFFICE: 332 South Michigan Avenue
DETROIT OFFICE: 23906 Woodward Ave., Pleasant Ridge, Mich.

(*Concluded from Page* 131)

Washington, Oregon, Arizona, New Mexico, Idaho, and Utah.

Producto Machine Co., Bridgeport, Conn., announces establishment of die set assembly facilities at Machinists' Tool & Supply Co., 2827 Supply Ave., Los Angeles, Calif.

NEW OFFICES

Ransome Co., Scotch Plains, N. J., opened a branch office at 345 Mt. Lebanon Blvd., Pittsburgh, Pa. P. J. Patton is regional manager. Ransome produces welding positioning equipment at its plant in Houston.

Cutler-Hammer Inc., Milwaukee, has opened sales offices in Peoria, Ill., San Diego, Calif., and Wichita, Kans. Managers will be: J. J. Witmer in Peoria, J. H. Tuttle in San Diego, and C. C. Barnds in Wichita.

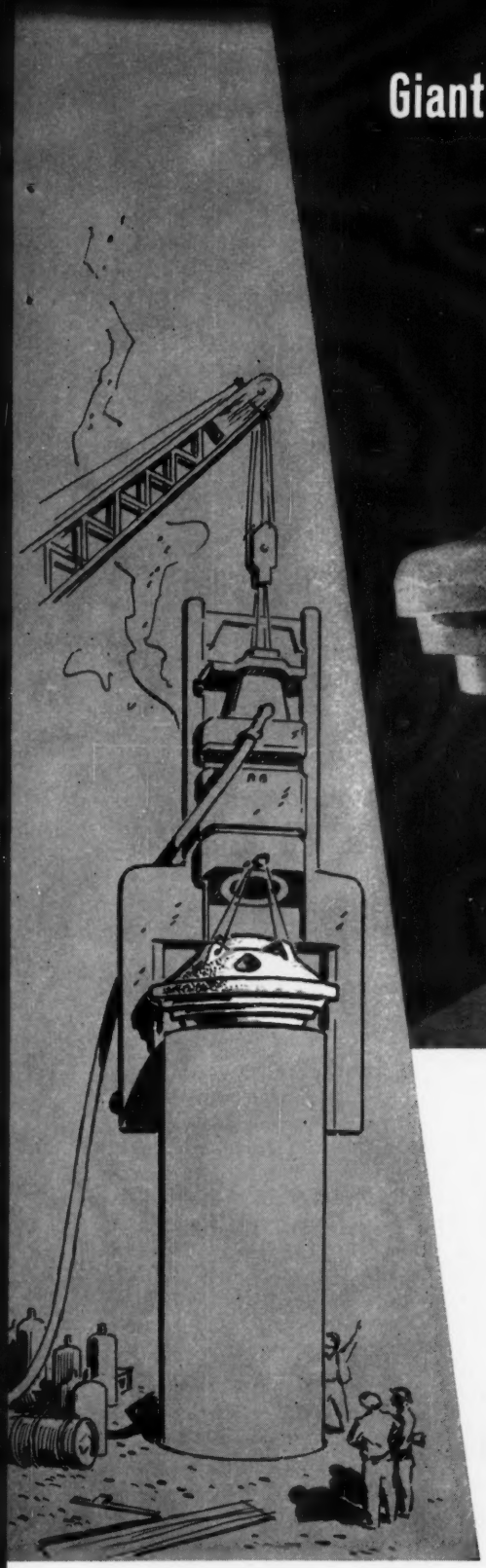
NEW PLANTS

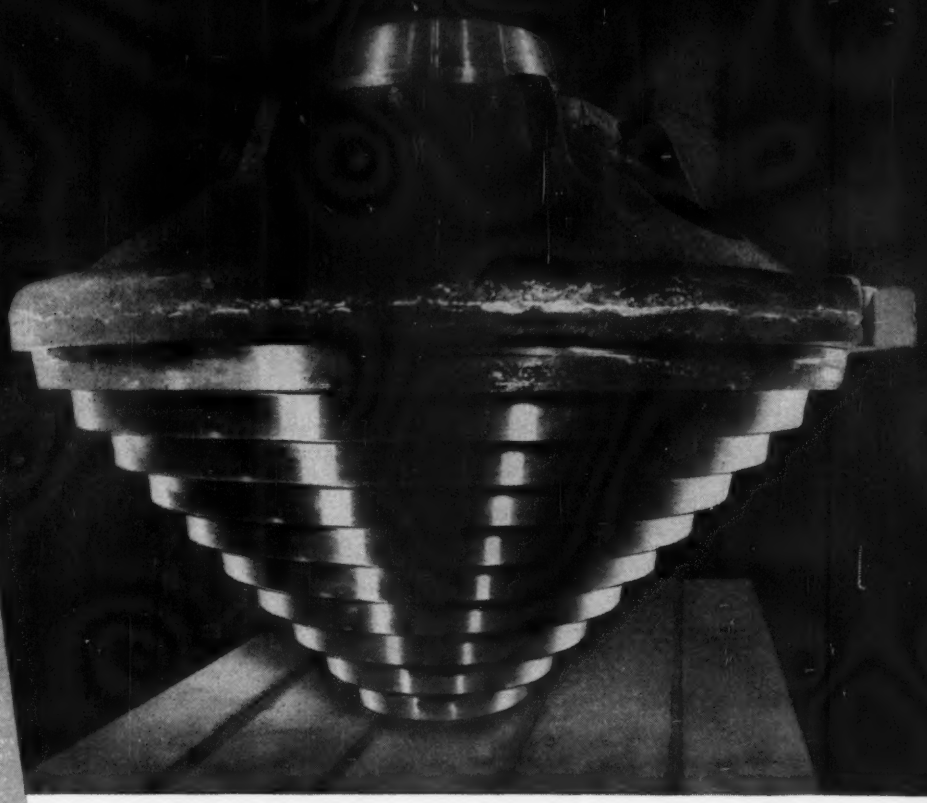
Norge Div., Borg-Warner Corp., Chicago, has awarded a contract to Dickmann-Pickens-Bond Construction Co., Little Rock, Ark., for construction of a $10 million home appliance plant at Ft. Smith, Ark. The plant will contain 1 million sq ft of floor space.

Machlett Laboratories Inc., a division of Raytheon Co., Waltham, Mass., plans to build a 120,000 sq ft plant at Winsted, Conn. Sales and executive offices of the division will remain at its plant in Springdale, Conn. The division makes electronic devices.

Storm Seal Industries Inc. opened a plant at 22901 Aurora Rd., Bedford Heights (Cleveland), Ohio. The firm makes aluminum windows, doors, and awnings. Equipment includes a new, 1000 ton, extrusion press which will be used to extrude components for the firm's building products and a wide variety of shapes for industiral customers. The new facilities increase Storm Seal's productive capacity by

Giant Cast Steel "Top" For An Oil Explorer





If this 17,540 pound cast steel pipe cap were not used to set a string of oil well casing, it could be mistaken for a gigantic spinning top. Either way, here is visual proof of the diverse requirements for industrial steel castings which are satisfied by the experienced engineers, metallurgists and skilled foundrymen of Erie Forge & Steel Corporation. From the open hearth melt through the machining operation to the shipping dock, close quality control is our prime concern.

Erie Forge & Steel for many years has been making Steel Castings for rolling mills, cement mills, blast furnaces, presses, forging hammers, power turbines, ships, oil field production equipment and heavy industrial machines.

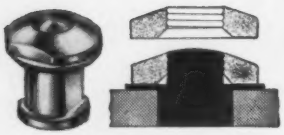
You can depend upon us to meet your most severe steel casting and forging requirements.

ERIE FORGE & STEEL CORPORATION

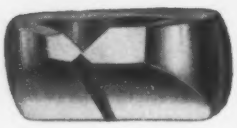
ERIE, PENNSYLVANIA

Flat end snubs against object and grips where rounded nose pliers would fail.

Deep cut-teeth provide secure grip. Curved sections have large, deep-broached teeth to grip pipe, etc.



Special slotted washer and chamfered nut provide lock-washer action — will not work loose.



Overlap shear action cuts better — saves edge . . . provides non-slip action.

Star chamfer holds rivet from turning — holds jaws in alignment.

Special hardening and precisely machined joints keep needle-nose jaws in line.

Tips for Measuring the Real *Work Ability* of Pliers

Check the photos above. Shown here are features you have a right to expect in a plier or cutter — features you *get* when you buy SNAP-ON.® In addition, SNAP-ON gives you —

Through hardening for extra toughness.

Broached stud-positioning hole for true bearing surface and snug, easy-working joint.

Drilled and reamed rivet holes on needle-nose for easy use.

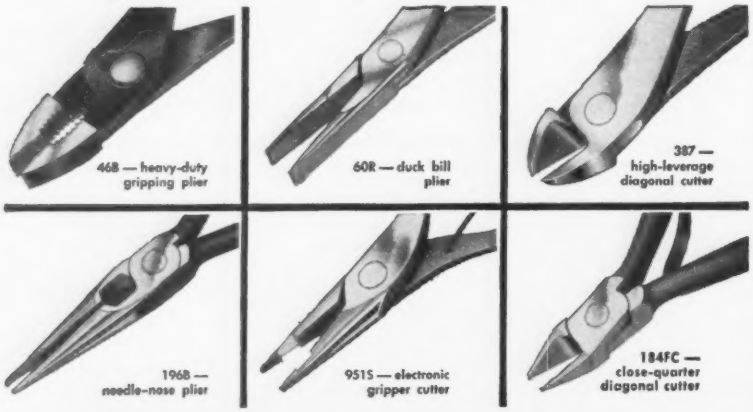
Broached and ground joint surfaces for smooth operation, snug fit.

Engineered handle design for correct leverage.

Over 60 models and sizes to let you choose the best one for your production or maintenance job.

Your SNAP-ON Sales Engineer can give you more information on the complete plier line. There's a SNAP-ON Branch Office in every major U.S. industrial center.

Or write for catalog listing the complete series, plus full range of wrenches and hand tools.


468 — heavy-duty gripping plier
60R — duck bill plier
387 — high-leverage diagonal cutter
1968 — needle-nose plier
951S — electronic gripper cutter
184FC — close-quarter diagonal cutter

SNAP-ON TOOLS

FOR ALL INDUSTRY

8121-E 28th Avenue • Kenosha, Wisconsin

300 per cent and will permit the company to raise aluminum product shipments to about 2 million lb annually.

A $15 million plant for the production of anhydrous ammonia and related products will be built near Joplin, Mo., by **Solar Nitrogen Chemicals Inc.** The company is owned equally by Standard Oil Co. (Ohio), Cleveland, and Atlas Powder Co., Wilmington, Del. The plant will be operated by Atlas. A $2 million expansion program is underway at Solar's plant at Lima, Ohio.

NEW ADDRESSES

National Cylinder Gas Div., Chemetron Corp., Chicago, moved its Northeastern regional accounting office to 1 Belmont Ave., Bala-Cynwyd, Pa.

Medelton Co. Inc. moved to larger quarters at 262 E. Third St., Mt. Vernon, N. Y. The firm manufactures tools, dies, stampings, and does precision machining.

ASSOCIATIONS

William F. O'Dell, Market Facts Inc., Chicago, assumes office as president of **American Marketing Association**, that city, July 1. Other officers will include J. P. Bennett, I-T-E Circuit Breaker Co., Philadelphia, treasurer, and Margaret L. Reid, Plastics Div., Monsanto Chemical Co., Springfield, Mass., secretary. Albert W. Frey, consultant, has been elected president for the year beginning July 1, 1961.

American Supply & Machinery Manufacturers' Association Inc., Cleveland, elected these officers, effective June 1: President, Samuel D. Conant, Jacobs Mfg. Co., West Hartford, Conn.; first vice president, P. A. Johnson, Dake Corp., Grand Haven, Mich.; second vice president, G. H. Woodland, Chain Belt Co., Milwaukee; secretary, Lewis Barnard Jr., Lufkin Rule Co., Saginaw, Mich.; and treasurer, W. H. North, Ferry Cap & Set Screw Co., Cleveland.

where moisture
and abrasion
meet **brightness**
that never wears out

sink frames of

Superior

STAINLESS STRIP STEEL

At the toughest spot in the kitchen, Superior Stainless shows its metal best . . . the ever-bright, smooth gleam that asks no more than a wipe to reflect a housewife's pride. • Solid Superior stainless sink frames fabricate uniformly well because composition, dimensions and temper are uniformly as specified, every time. • We can serve you exactly as you wish. Ask us!

SUPERIOR STEEL DIVISION
OF
COPPERWELD STEEL COMPANY
CARNEGIE, PENNSYLVANIA
For Export: Copperweld Steel International Company, New York

Sixteen clues on why designers look to Fafnir for selection in ball bearings!

You won't find a wider selection of precision ball bearings anywhere! Fafnir makes over 10,000 types and sizes. They range from miniature bearings (upper left) to 60-pound pillow blocks—and cover requirements in every major industry.

And the family keeps growing! The sixteen bearing developments above are among the more recent additions — and include (second from top at right) bearings with Fafnir's newly-designed rolled-in Plya-Seals that prevent seal loosening or push-in.

Also shown are rubber-cushioned ball bearings for air conditioning equipment, bearings for farm equipment, and special-precision aircraft types, an industry "first". Whatever *your* ball bearing needs, you'll find Fafnir can meet them.

Write for full information. The Fafnir Bearing Company, New Britain, Conn.

FAFNIR
BALL BEARINGS
Progress in motion

BEATS THE HEAT—A modified 80-20 nickel-chromium alloy reportedly offers longer service life for resistance elements in reducing atmospheres, less carbon pickup in carburizing, and the ability to withstand other corrosive elements in furnace atmospheres. Hoskins Mfg. Co., Detroit, says the material contains minor percentages of iron, silicon, cobalt, manganese, and columbium. Some 200 alloys were tested in the program.

THINNER NUCLEAR FOILS—Ultrathin uranium, thorium, and similar metals can be had in thicknesses down to 0.0005 in. and widths up to 12 in., claims M & C Nuclear Inc., Attleboro, Mass. The firm says the development required a major advance in metalworking techniques.

CHEMICAL ASSIST—Studies of welds and joints in dissimilar metals may be aided by a method of determining solubility product constants. Work at the University of Cincinnati started with studies of diffusion in a gel. Two compounds at either end of a tube of a gel diffuse through the medium toward each other. When they meet, a compound is formed. The time at which the band starts to form is the basis for the calculation. Researchers are now looking at antimony and aluminum in copper.

BEARING NOTE—Dopesters say government agencies are at odds over needs for better high temperature bearings. One claims to have no problems; a second says it can supply all the help contractors need; the third one is bawling loudly for a special program to overcome current limitations. Some contractors would appreciate an appropriation for basic research.

DOWN TO FUNDAMENTALS—High purity chromium and yttrium have been prepared by scientists at the Metallurgy Research Center, Bureau of Mines, Albany, Oreg. Removal of impurities increases the ductility of both metals. High purity chromium has been made into sheets and wire; irradiated chromium wire may help in cancer cases. Basic purpose of the work is to learn more about the properties of metals, and how they are affected by impurities.

REPORT ON NITRIDING—Nitriding of titanium increases its hardness; the process has been used for jet engine fuel valves. So it was tried with a 6A1-4V alloy. But the nitrided parts showed elongated grains extending downward into the core. Result: A reduction in impact strength and a thinner layer of surface nitride. The investigation turned up another surprise. Thickness of the nitrided layer increased continuously with time, contrary to earlier reports.

BREAKTHROUGH FOR PLASTICS—In the automotive field, it may be an all plastic gasoline tank, says Dr. Herman Mark, Brooklyn Polytechnic Institute. He says such a tank could be made from fire resistant, glass fiber-reinforced polyesters. Adhesives could be used for sealing. Pipe connections also could be plastic. The tank would be one-fourth to one-fifth the weight of a steel tank with the same volume.

METAL GLUE—Cobalt is being used as a continuous phase, or binder, in such materials as carbides, and cobalt alloys are being used in powder metallurgy. The Cobalt Information Center, Battelle Memorial Institute, Columbus, Ohio, has prepared a summary of the powder metallurgy of cobalt and its alloys, analyses, and properties. It's available for the asking.

CLOSE WORK—A new method of determining the value of the faraday, a basic constant in chemistry and physics, has led to a value accurate to 2 parts in nearly 100,000. Scientists at the National Bureau of Standards reversed the usual method of plating silver from a solution; deplating from a silver anode in a solution of perchloric acid gave the improved results. The bureau reports that the results agree with an entirely independent physical method (oscillation frequency of a proton) within 22 parts per million.

Use of plastic patterns for production parts is discussed by Robert A. Horton, Claude H. Watts, and Robert R. Miller

Ceramic Shell Molding Gets Boost

STEEL
EXCLUSIVE

Company perfects plastic pattern technique that extends scope of process. Problem was: Expansion rate of patterns limited their application to flask type procedures

POLYSTYRENE patterns can now be used in ceramic shell castings.

Significance of the development: The technique was limited to flask type investment molds because the expansion of the plastic is greater than the ceramic, causing shells to crack.

In an exclusive interview with STEEL, Robert R. Miller, president of Precision Metalsmiths Inc., Cleveland, said that the new process can cut the cost of investment castings as much as 30 per cent.

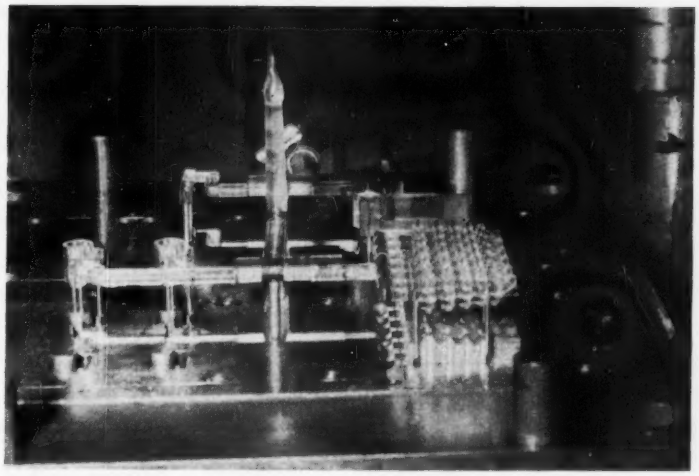
"Use of multiple section molds makes relatively short runs economically practical," states Mr. Miller, "although we do not expect that the use of wax patterns will be eliminated. But plastic patterns can also be used for prototype work by machining test patterns from solid plastic before going to the expense of making dies. And the shell process lets us make pattern assemblies 50 per cent higher than the flasks, still casting in shells without backup."

• Wider use of the plastic patterns is expected because of multiple section molds.

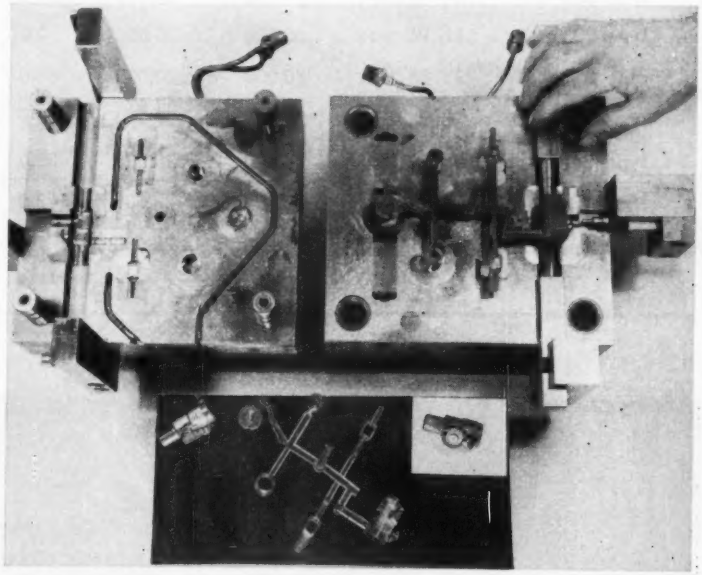
The polystyrene patterns are formed by injection molding of the plastic in steel dies at 400° F and pressures of 700 to 1500 psi. Dies are designed with multiple sections. Large machines may have eight such sections, and when a run is completed on a part, the dies in that section are removed and replaced with others to make another shape. The importance of the technique is pointed up by Leo E. Carr, who is in charge of special projects for the company: Relatively short

runs of plastic patterns are economically sound; individual large molds for each part or group would limit the process. Long runs at high production rates will continue to favor the use of plastic patterns.

Lower cost is another advantage of plastic patterns. The polystyrene is less expensive per pound than the special wax used for the preparation of investment patterns; it is also less fragile. Forming rates are as much as ten times those of wax, and handling losses are reduced. (Unlike wax, plastic is not recovered; recovered wax is used for sprues.) Parts are joined when making complex patterns by the use of a plastic cement; the finished pattern is transparent so that placement of any internal components can be seen.



Eight sections in this die can be changed individually, making short runs possible with plastic patterns



Complex parts are built up in sections. Foreground: Assembled pattern, components as molded, photo of cast part

• Assembly of plastic patterns into "trees" is similar to the use of wax.

In building up the assembly or "tree" used for casting, a wax center sprue is used. Operators place the patterns in a carefully planned array around the sprue. Space is left on one side to permit subsequent cutting of the cast parts from the core. Pattern setup is carefully studied because it can determine the proportion of rejects, even whether the part can be cast at all. Records are kept to show how each part is to be handled; they are used as a guide every time the job is rerun.

Elimination of the flask used for some types of investment casting makes pattern setup easier. Restrictions on the size and shape of the finished tree are reduced or eliminated; the maximum height of flask molds used by Precision Metalsmiths is 16 in. Pattern setups for ceramic investment shells are as high as 24 in.; others are 20 in. in diameter.

• Improvements have been made in the investing process for ceramic investment casting.

When the wax sprue is formed for the tree assembly, it contains a threaded metal insert in its base. After the patterns are in position, the tree is turned over, and a metal handle is screwed into the insert; it is used to support the assembly during the next steps.

The moldroom, where the shell is formed around the pattern, has its temperature controlled between 72 and 78° F to prevent possible cracking of the shell material because of thermal expansion differences between the wax or plastic and the ceramic. Relative humidity is controlled at 60 per cent or less to speed drying of the ceramic slurry.

The first dip is into a water slurry of silicic binders and silica flour from fused silica. Binders and refractories are 325 mesh and finer—an important factor if finished parts are to have good surface finish. A mixer keeps the slurry in constant motion to prevent settling out of components. After dipping, excess slurry is allowed to drain from the parts. Coating is carried up only as high as the sprue base.

While the first dip is still wet, the assembly is dipped again. This time, it enters a "bath" of fine sand —fused silica grains which are needle shaped and 0.010 to 0.020 in. on the major axis. Air pressure from the bottom of the tank holding the sand fluidizes it, coating all portions of the pattern within 5 to 10 seconds. Placed on a rack, suspended by the handle, the "stuccoed" pattern assembly is dried in a gentle air current for an hour.

A second dip in a slurry follows drying. The slurry composition is

Casting Properties

Material	Rockwell Hardness	Tensile Strength (Minimum)	Yield Strength (Minimum)	Elongation % (Minimum)
SAE 4140	Rc 39/43	180,000	160,000	5.0
	Rb 94/100	100,000	90,000	20.0
SAE 4130	Rc 32/36	150,000	125,000	10.0
	Rb 92/98	90,000	60,000	20.0
17-4 PH (Armco)	Rc 40/44	180,000	150,000	6.0
Type 440	Rc 40/44	180,000	150,000	8.0
	Rb 94/100	95,000	75,000	12.0
Type 416	Rc 38 min	160,000	130,000	5.0
	Rb 92/97	95,000	75,000	8.0
Type 302	Rb 88 max	70,000	35,000	35.0
Type 303	Rb 88 max	70,000	30,000	25.0
Type 304	Rb 88 max	65,000	30,000	30.0
Type 310	Rb 88 max	70,000	30,000	30.0
Type 316	Rb 88 max	70,000	30,000	30.0
Type 347	Rb 88 max	70,000	30,000	30.0
356 Aluminum T6	Re 72/92	40,000	28,000	3.0
355 Aluminum T6	Re 75/99	41,000	28,000	2.0

the same as that first used, but the viscosity is considerably lower, so that the slurry will fill any voids in the first two coats. Good penetration insures better surfaces on the final castings. Coarser sand than that first applied is used to coat the second slurry, again followed by air drying.

• For the third, and all subsequent layers, the slurry is thinned further, and the sand used is coarser.

The number of dipping and sanding steps determines the thickness of the shell; four to ten coats are usual, and the resulting shell will be from ¼ to ½ in. thick. Precision Metalsmiths reports that the ¼ in. shell has been used without a backup of sand or shot to hold a cast of metal weighing 100 lb; using heavier shells, casts up to 150 lb have been made unsupported.

Final drying takes 4 hours.

• Key to the use of the plastic patterns is in their removal from the mold.

Details of the process are not available because patents are pending. The process was developed by Robert A. Horton, working with

Wax sprues are used for assembling the polystyrene patterns into trees. Container of patterns demonstrates ease of handling

Claude H. Watts, director of research and development.

Differential expansion of the plastic and the ceramic was responsible for cracking of the mold in earlier trials. Some users considered solvents to attack the patterns. Precision Metalsmiths uses a burnout procedure which avoids the cracking, leaves the mold clean and free from carbon deposits.

Final burnout temperature is about 1800° F, and the burnout cycle takes less than 10 minutes compared with hours with typical flask type molds. After the burnout, the molds may be removed and held for storage.

Before making the cast, the mold is heated in a furnace held at 2000° F for an hour. The high temperature firing strengthens the ceramic bond. Although the interior of the mold is smooth (it may be 40 microinches or better), the firing eliminates all traces of the vehicle in the slurry, and the mold becomes porous or permeable to air.

• Pouring is done while the mold is still hot from the high temperature furnace.

Simplest practice is to pour the molten metal directly into the heated mold. Other processes are used when the shape requires more involved means to assure complete filling of the mold and the required surface finish. Pressure or centrifugal casting methods build up the force of the molten metal; an asbestos gasket is used to form a seal in a vacuum chamber when thin sections or the shape of the part would not permit proper filling.

Molds are handled individually. Workers use asbestos gloves and may set up several molds for the melter. Prior to pouring, a check of the metal temperature is taken.

• As cooling proceeds, a large part of the shell spalls away from the metal.

Cleaning follows conventional procedures. Blasting may be used, and a Virgo salt bath removes the investment material from interior holes which would otherwise be difficult to reach. The finished parts are cut from the sprues and inspected before shipment.

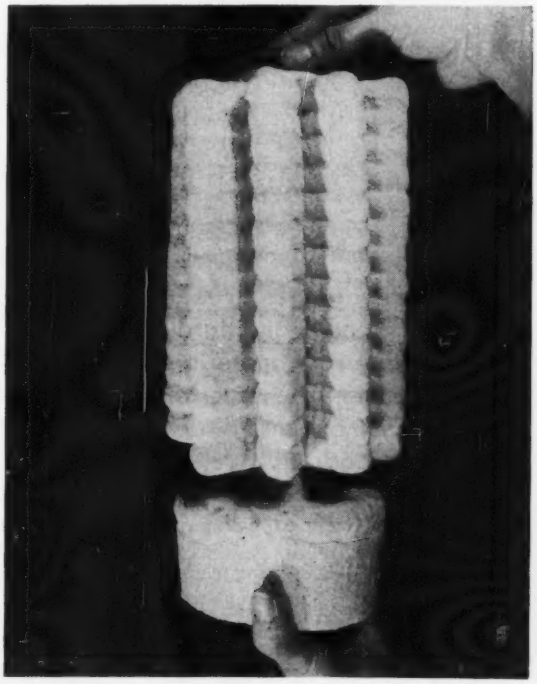
• The process offers considerable flexibility.

The use of the multiple section die permits short runs of plastic patterns, while experimental parts can be formed from sheets of the same material. Parts assembled on the sprue may be of several different types. And some assembly of the components may be made in the pattern stage.

Where ceramic shell castings are used they also reduce decarburization because of more rapid solidification at the surface. The mass of the cast part and the amount of heating above the melting temperature determine the amount of the decarburization. So thin walled sections and small parts may have less than 0.003 in. of decarburization, while heavy sections may have as much as 0.015 in. Thin sections as part of a heavier casting will show less loss of carbon than will the heavier portions.

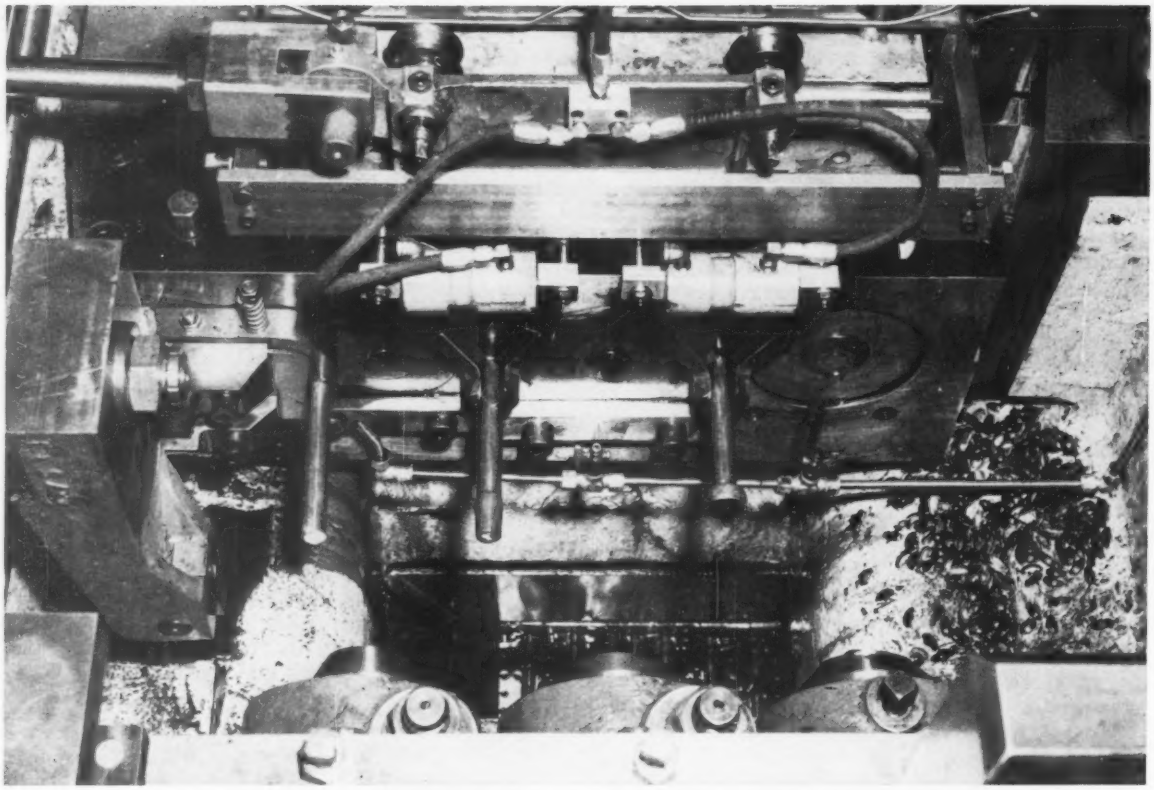
The more rapid cooling characteristic of the ceramic shell castings results in a fine grain size, particularly in thin sections and at the surface of heavier areas. The factor, it is believed, accounts for improved properties (about 10 per cent in tensile strength) as compared with the same metal and part cast in flask type molds.

Fluidized bed of sand eases coating problems. Tree is dipped in slurry first, then in sand



Shell mold after coating has been built up. With handle removed, it is ready for burning out

Waterbury Farrel Gets Set . . .



Machines like this progressive header bang out parts at high efficiency and with excellent uniformity. Examples are shown on opposite page

Among advantages cited: Parts are stronger and harder than the raw material; reduced waste; raw material is relatively inexpensive; accuracy is good; and reject rate is low

COLD FORMING is being called the most promising "of current production methods" by an increasing number of industrial authorities.

Among those who agree with that view is Donald R. Schurman, assistant manager, Cold Heading Machinery Div., Waterbury Farrel Foundry & Machine Co., a division of Textron Inc., Waterbury, Conn. He is convinced that its cost saving potential has hardly been tapped. (Auto people agree. See STEEL, Apr. 4, p. 108.)

Some of the advantages of the method cited by Mr. Schurman:

- Finished parts are stronger and harder than the raw material.
- The method produces parts with less waste than straight machining.
- Raw material is cheaper (cold drawn wire vs. bar stock).
- Finished accuracy is consistent.
- On the whole, users report few rejected pieces.

• Cost differences between machining and cold forming can sometimes mean the difference between staying in business and failure. Here's a case cited by Waterbury.

For years, a small Eastern manufacturer machined plumbing fittings. He found himself with his back to the wall when a big competitor switched to cold forming. Prices were forced down to a level that meant consistent losses to the small man; in fact, the selling price was less than raw material costs.

The small businessman managed an $85,000 loan and invested in a cold forming machine. Almost immediately, he was able to lower

. . . for Big Gains in Cold Forming

prices and meet competition. Savings enabled him to meet a $3500 monthly payment and still make a profit. He expects to order several more machines.

• **"It's not yet possible to state all the rules for solving every forming job that comes along," states Mr. Schurman. "The field is moving too fast. But two basic approaches are being used successfully."**

One method begins by cutting wire or rods into billets which are phosphatized and lubricated by a hard soap coating. A press pushes them into their final shape in a single stroke.

The other method (favored by Waterbury) features a progressive die arrangement (up to five stations). The coiled wire or rod is fed directly into the press through a straightener — the finished pieces drop out the end. Lubrication is provided within the machine during forming.

Mr. Schurman believes the progressive die method saves considerable handling and is faster. His firm concentrates on doing all the forming with the punch and works with backward extrusion almost exclusively. If both ends need to be extruded, transfer devices are provided with turn-around mechanisms.

• **Here are some developments at Waterbury.**

Customers should be quite open minded about cold forming, Mr. Schurman feels. "Be prepared to try several approaches before making a decision—the first one picked doesn't always work."

Waterbury is working on these projects: A new building in Cheshire, Conn., which will permit a greater output of cold formers; a 2 in. former which will turn out 35 to 40 nuts a minute; cold headers which make 180 standard ¾ in. rivets per minute. (They have a high finish and a good looking cutoff at the foot which is square with the shank.)

One problem cited by Mr. Schurman: Better lubrication is needed to cut the number of operations.

Valve Spring Retainer

Automobile part is cold formed from the small piece of rod. Rate: 60 a minute. Old method: Stamped from a flat strip; finished scrap ran 15 to 17 per cent, press scrap as high as 60 per cent. Small disc at right is waste

Flared Tube Nut

General Motors inverted nut is turned out at 125 a minute, exceeding the figure the Waterbury people had planned. (Waste is shown at right.)

Heavy Washer

This part is formed without any waste or scrap

Automobile Thermostat

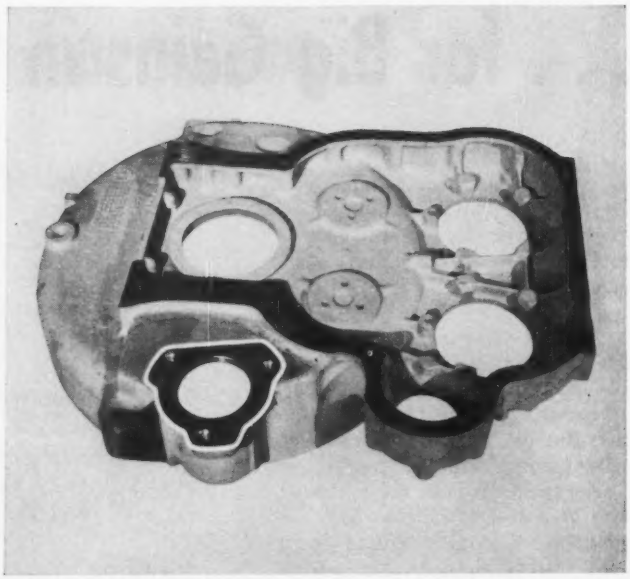
This design is competitive with present bellows types. Brass billet is formed into cup which holds the several pieces that make up the device (right)

Sparkplug Shells

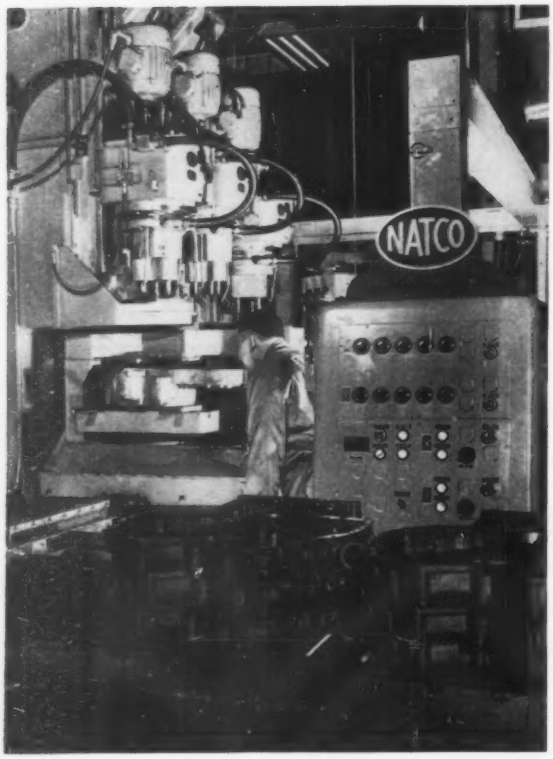
Sixty parts a minute are being formed from cold drawn rod. Even with a cutoff and five heading stations, concentricity is held to within 0.002 in. total indicator reading. The firm used to make the parts from hex bar stock on an automatic screw machine

Tape Controls 160 Variations On a Machining Job

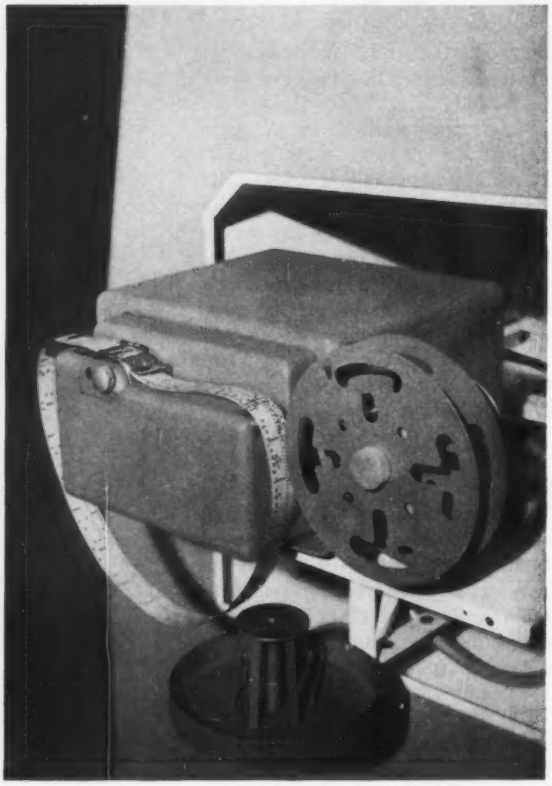
Engineers ran into the problem in the machining of flywheel housings for a series of diesel engines: Mounting faces for starter come in 160 types. Tape control was the answer



PROBLEM: Flywheel housing fits a series of industrial, marine, and truck diesels. The starter pinion hole is surrounded by three holes for mounting bolts. Layout varies with each model. (There are 160.) Production is 50 to 500 per lot

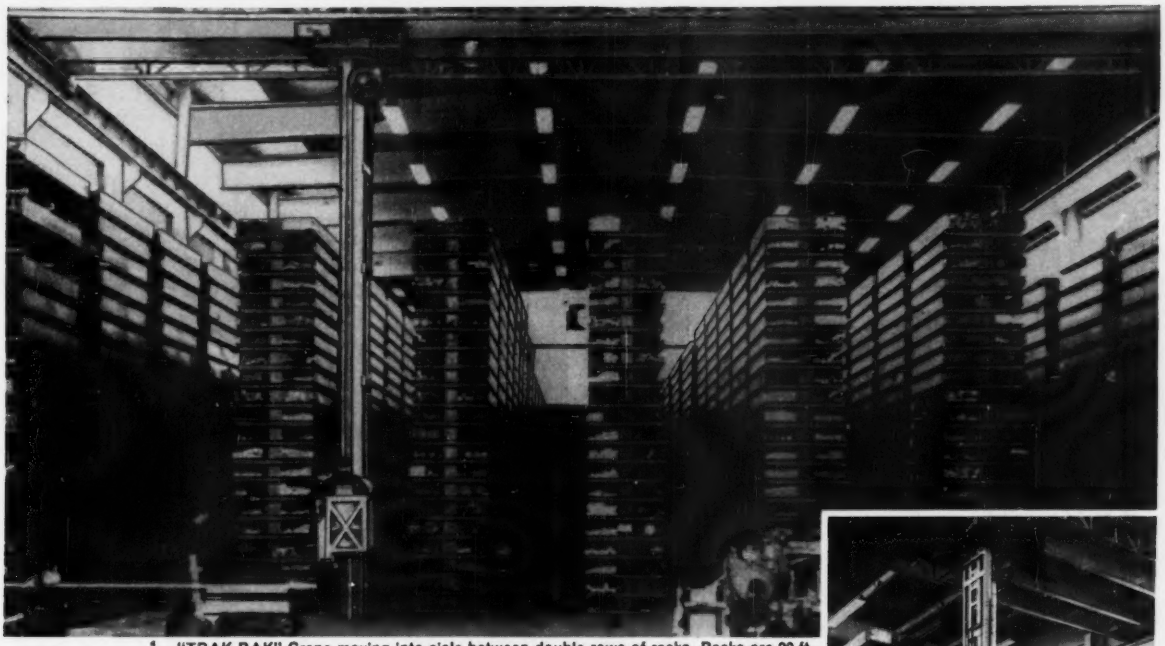


THE BRAIN: Short tape loop contains all operating instructions: Location of work table and feeding sequence. It's prepared directly from blueprints



SOLUTION: Special drilling and tapping machine (supplier, National Automatic Tool Co. Inc., Richmond, Ind.) bores starter pinion hole, drills and taps mounting holes in 3½ minutes. Tolerances are within 0.005 in. Conveyor puts housings into loading position. Operator changes tape to match parts

Steel Warehouse Handles 3500 Stock Items with "TRAK-RAK" Crane
——— *Reduces Operating Costs...Speeds Service*



1. "TRAK-RAK" Crane moving into aisle between double rows of racks. Racks are 20 ft. high. Distance from floor to underside of roof truss is 30 ft. Aisle width is 5 ft.-4 in.

Edgcomb Steel of New England, Inc. warehouses 3500 different items of steel, stainless steel, brass, and aluminum bar stock in an area 60 feet wide, 27 feet high, and 160 feet long.

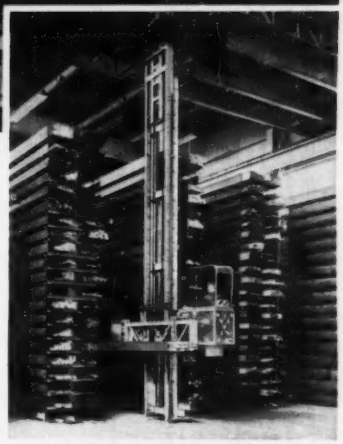
ONE man and a "TRAK-RAK" Crane serve the five double rows and two single rows of "Christmas Tree" racks which hold 2700 storage trays. Edgcomb processes approximately 2500 to 3000 orders per month, and the company reports very favorable reductions in operating costs and faster order processing and delivery.

Edgcomb's "TRAK-RAK" Crane has a traveling bridge (Photo 1) which spans the storage bay, and an overhead trolley from which is suspended an electrically operated rotating column equipped with a carriage for handling the storage trays. All operations of the crane and carriage, which rotates, moves toward or away from the racks, and raises or lowers on the column, are controlled by the operator who rides with the carriage. Safety switches prevent the column from running into a rack and permit full rotation only when the unit is safely beyond the end of the racks.

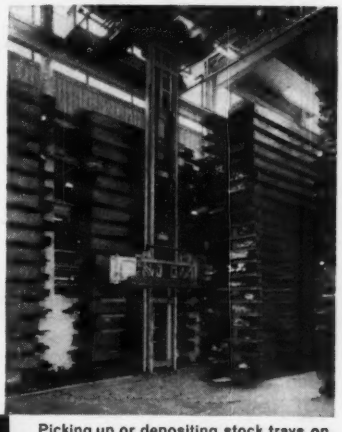
Hundreds of "TRAK-RAK" installations, designed to meet the user's particular requirements are in use today. They are handling many types of material and loads with great speed and economy. Specific advantages the "TRAK-RAK" System of vertical storage and handling brings to the user are:

1. **Maximum utilization of the cube to permit storing and handling more material in less floor area.**
2. **Faster material movement in and out of storage.**
3. **Reduction in personnel and lower labor costs.**
4. **Improved safety, better housekeeping, precise inventory control.**

Take the first step toward faster, more efficient material storage and handling now. Write for complete details on "TRAK-RAK." Chicago Tramrail Engineers are available to discuss your handling problem with you at any time—and at no obligation to you.



Crane with operator, who rides with carriage, emerging from aisle with loaded stock tray.



Picking up or depositing stock trays on the rack is a fast, safe operation. Trays and rack sections are color coded for quick location and identification.

CHICAGO TRAMRAIL CORPORATION
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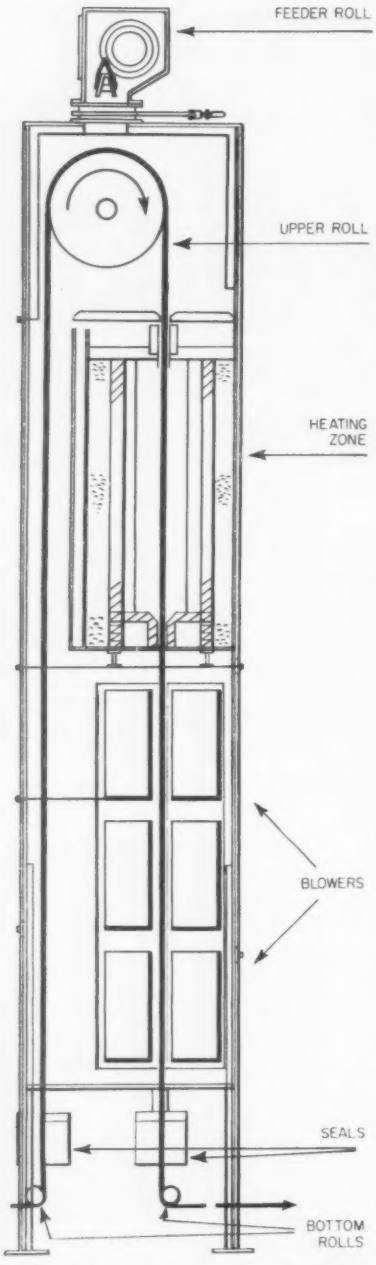
Specialists in the design, manufacture and installation of material handling systems for steel warehouses and other industries

New Furnace Boosts Bright Anneal Output



Rolls don't touch stainless strip while it's being heated and cooled; material is cool enough to touch when it leaves the tower furnace

Oxide formation on stainless strip is prevented by fast heating and cooling in a hydrogen or dissociated ammonia atmosphere; rolls don't touch material in process

TONNAGE production of bright annealed stainless steel is expected to lower the cost of premium metal for special uses and to make the material a more practical one for general applications.

A vertical annealing furnace, developed at the Industrial Heating Dept., General Electric Co., Shelbyville, Ind., processes 60 ft of 0.020 in. stainless strip a minute, in widths up to 48 in.

• Bright annealing is said to offer faster stainless steel processing and to reduce annealing costs about 50 per cent.

A large part of the stainless processed is used in the automotive industry. Most popular: Type 430, in 0.010 to 0.035 in. widths.

Material from the hot strip mill—about ⅛ in. thick—can be rolled to 0.060 or 0.070 in.; then it must be annealed, to eliminate work hardening, before it is reduced further. In most annealing processes, chromium oxide forms on the material and must be removed before further cold rolling.

About 1 per cent of the stainless used is bright annealed. Oxide formation is eliminated, but bright annealing methods in use are expensive, and the material is practical only in special applications.

High speed processing in the tower furnace should make the bright annealed strip available for most uses, say General Electric engineers.

• High surface quality is insured; the material doesn't touch furnace rolls during annealing.

Strip is drawn to the top of the tower, downward over the upper furnace roll, and into the heating chamber. The material doesn't touch the furnace rolls while it's hot. It is heated and cooled rapidly in a hydrogen or dissociated ammonia atmosphere; it is cool enough to touch before it passes over the bottom roll of the furnace. Fast heating and cooling increase furnace productivity.

Molybdenum resistance heating elements, backed by a high purity alumina insulation system, permit direct radiation to the strip. The elements and lining are said to give long service life in the hydrogen atmosphere.

In the cooling chamber, several blowers force hydrogen, at high velocity, against the strip surface. The gas is blown in many streams, perpendicular to the path of the material in process. General Electric's engineers say the technique eliminates the skin effect, common when the coolant flows parallel to the strip, and does a better cooling job. Heat transfer rates are said to be many times greater than those of conventional coolers.

Heated atmosphere gas is passed through a water cooling system and recirculated. The hydrogen is said to have better heat transfer properties than most materials; it is also lighter and easier to move with fans.

• Pressure differential and furnace seals protect atmosphere purity; they also help hold down the cost of operation.

Gas pressure inside the furnace is

METALGRAMS

UNION CARBIDE METALS

. . . news about "Electromet" ferroalloys and metals

MAY, 1960

NEW EXOTHERMIC CHROMIUM SAVINGS -- Open-hearth melters using an exothermic ferrochrome ladle practice can save from 50 to 60 cents per ton by using new "Chromtemp" ferrochrome 25-6. The silicon content of the alloy (6.25 lbs. per can) saves the steelmaker money by replacing separate ferrosilicon additions required with straight chromium exothermic alloys. Your Union Carbide Metals representative will be glad to give you further information.

* * *

EXOTHERMIC WITH MORE HEAT -- Closer control of large open-hearth ladle additions can now be obtained with the greater exothermicity of "Chromtemp" exothermic ferrochrome and "Mantemp" exothermic ferromanganese. The improved reaction promotes greater stirring, minimizes segregation, and dissolves the alloy faster. The result is better control of alloy analyses, resulting in fewer off-grade heats. Specification sheets for these alloys may be obtained by requesting F-20,124 and F-20,125.

* * *

LESS GAS THAN EVER -- Producers of vacuum-melted steels and high-temperature alloys have improved their melting operations with new "Elchrome" VG electrolytic chromium. Having less than 0.06 per cent oxygen and extremely low hydrogen and nitrogen contents, this high-purity vacuum-grade chromium has the lowest gas content commercially available. As a result, it's easier to maintain a vacuum and there's less spattering and boiling in the bath. Ask your Union Carbide Metals representative for the analysis of this improved chromium metal.

* * *

EYES ON PHILADELPHIA -- Foundrymen interested in the latest uses of ferroalloys to produce better castings will want to visit Union Carbide Metals' extensive exhibit at the 64th AFS Castings Congress and Exposition, May 9-13, in Philadelphia. The Union Carbide Metals' exhibit covers 41 foundry alloys. Featured are alloys that give better properties to cast iron, allow more efficient production of ductile iron, cut costs of steel, and give greater purity to aluminum. Experienced UCM metallurgists and engineers will be on hand to provide on-the-spot assistance. You are cordially invited to visit the exhibit and talk to UCM personnel. See us at booth No. 1214.

* * *

GASES ARE FLUSHED OUT -- A new alloy -- magnesium-calcium-silicon -- has been used successfully to flush out gases in high-alloy heats melted in the induction furnace. The alloy is added to the ladle and produces a vigorous flushing action. One producer reduced his rejection rate caused by gas imperfections from 30 to 5 per cent on a 35 per cent nickel, 15 per cent chromium casting. For the case history, write for the article, "Rejections Cut With New Alloy," in the Winter 1960 issue of UNION CARBIDE METALS REVIEW or contact your UCM representative for further details.

* * *

UNION CARBIDE METALS COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. In Canada: Union Carbide Canada Limited, Toronto.

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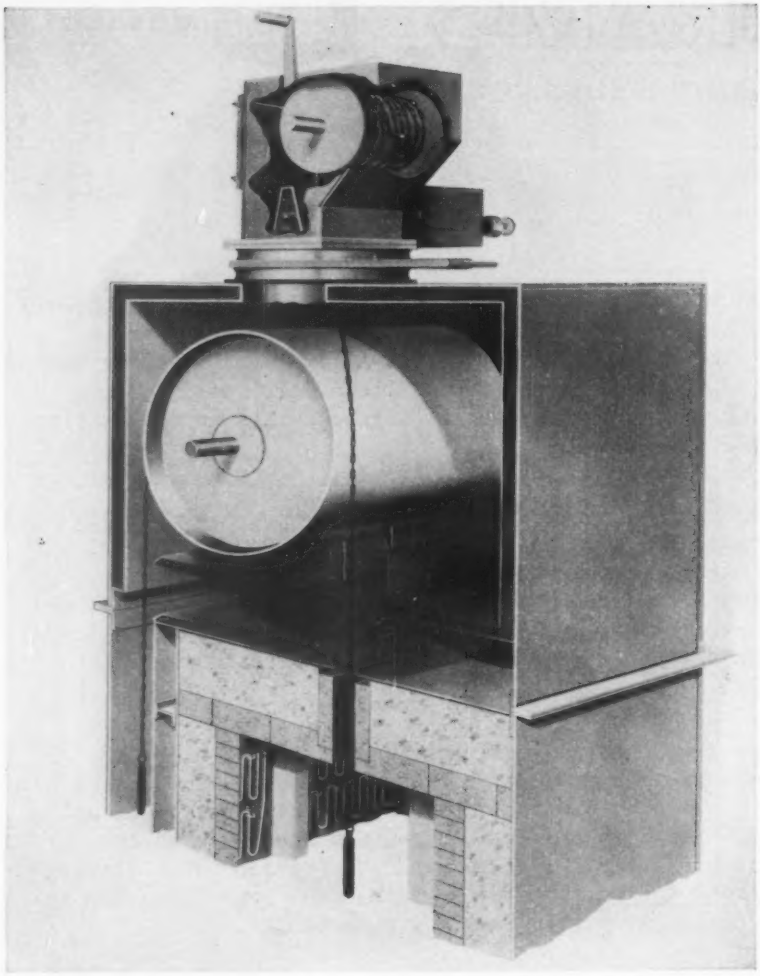


Feeder roll and threading chain minimize time required to start strip

slightly higher than atmospheric pressure, to prevent contamination. Seals at the inlet and outlet prevent excessive gas losses—an important factor in determining operating costs; bottled hydrogen used in the furnace may cost as much as $12.50 per 1000 cu ft. Dissociated ammonia can be used. Its cost: About $1.10 per 1000 cu ft.

Extreme dryness is vital in the furnace atmosphere to keep strip from spotting. Hydrogen in the furnace has a −60° F dew point (99.995 per cent dry), but the designers say some strip will require even drier gas.

Commercially pure hydrogen or dissociated ammonia, containing a negligible amount of oxygen, is purified further before it is used. It is passed through a catalytic purifier, where slight combustion occurs. The gas then passes through an absorption device to eliminate water vapor. Any oxygen left in the gas is dissipated immediately at annealing temperatures.

Designers of the furnace specified high purity alumina bricks for insulation because they don't break down at high temperatures, and they don't contaminate the furnace atmosphere.

• Annealing speed is reduced as heavier gages are processed, but output tonnage is boosted as strip width increases.

In a typical application—annealing Type 430 stainless strip, 0.020 in. thick, at 2000° F—the furnace handles 60 ft of material a minute. That's 6000 lb an hour of strip 24 in. wide. And that tonnage rate holds for other gages; material 0.010 in. thick is processed at 120 ft a minute, and strip 0.040 in. thick goes through the furnace at 30 ft a minute.

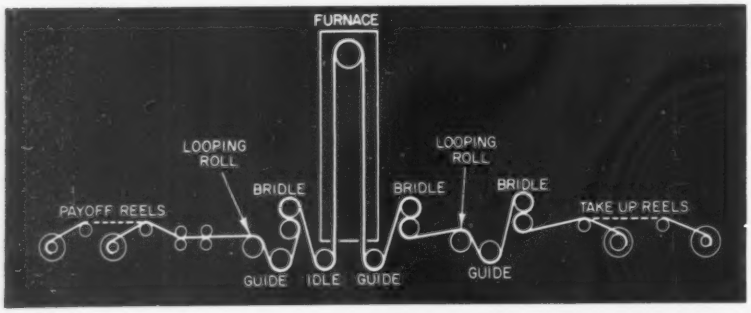
Furnaces are also available for 12, 36, and 48 in. widths. Output of the furnace depends on the strip width; the 48 in. furnace would turn out 12,000 lb of bright annealed material an hour.

Furnaces can be supplied in two heights—one about 54 ft, the other 75. Vertical construction of the units makes for minimum floor space requirements.

• Maintenance costs for the furnace should be low.

Heating elements are expected to last ten years or longer; lining bricks should be good for ten years under normal conditions. Heater and refractory life can be extended by keeping the furnace on long runs. Repeated heating and cooling aren't recommended.

Cooling water used in the heat exchangers should be clean, to prevent clogging of the tubes. If one of the coolers fails, it can be replaced as a unit.



Tower furnaces cut capital equipment requirements on bright annealing lines

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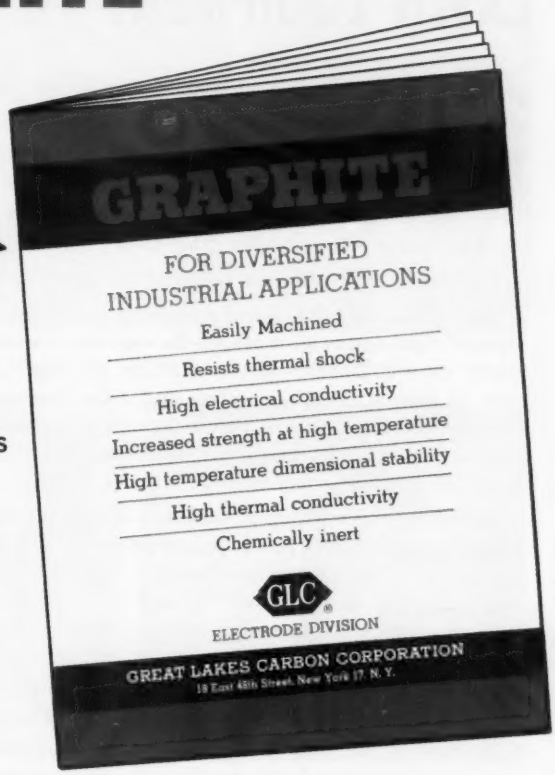

Graphite has a unique combination of physical and chemical properties. Its industrial applications are highly important and greatly diversified.

In metallurgy, graphite is the only practicable material for certain molds and castings. In metal fabricating, it has valuable applications in run-out tables, canisters and brazing fixtures. In refractories, it displays high resistance to thermal shock. New uses for graphite are being found in aircraft, missile and rocket manufacture, and in nuclear power programs.

Here is an informative brochure that outlines graphite's many uses, depicts highlights of its manufacture, and presents facts as to its physical and chemical properties.

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18 EAST 48TH STREET, NEW YORK 17, N. Y.

HOW DOEHLER-JARVIS' DAY-TO-DAY SERVICE HELPS MELNOR MASS PRODUCE HIGH QUALITY LAWN EQUIPMENT

Melnor Industries, Inc., is the leader in garden sprinklers and related hose hardware . . . items designed to high mechanical standards, modernly styled, priced for volume sale.

From the start, most parts of most items in the Melnor line have been die cast by Doehler-Jarvis . . . for reasons that Melnor sums up in the simple phrase, "day-to-day service."

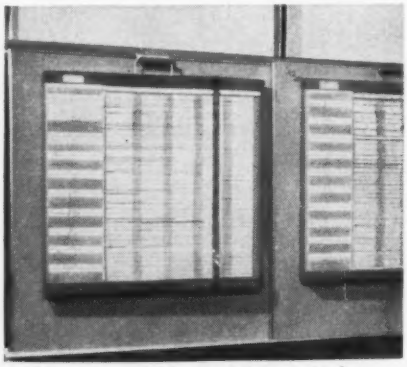
But this is a phrase that needs illumination, needs specifics.

Just what does Doehler-Jarvis include in this "day-to-day service" that means so much to die castings customers? As you might expect, Doehler-Jarvis provides all customary services, such as tapping, drilling, milling and other pre-assembly work. Doehler-Jarvis provides important extras, too . . . extensive assistance in parts design, for example, and complete finishing facilities. Even sub-assembly may be negotiated, if desired.

But more important than these is a sort of informal "partnership for production" . . . where key people in D-J keep in daily touch with their opposite numbers . . . with D-J's sales engineer coordinating all along the line. Through this mutual understanding and interchange of process knowledge, design is continually improved, costs continually reduced. Often difficulties are anticipated and entirely avoided by the close *personal* contact that exists at all working levels with Doehler-Jarvis customers.

Pictures at right show some of the points of contact . . . show some of the Doehler-Jarvis facilities that make this unique working relationship pay off for Melnor . . . as a comparable relationship might for you.

Close liaison during die design does much to keep Melnor's costs down. At this stage slight modifications in die or part often eliminate one or more operations. To attain this flexibility, D-J designs and makes its own dies.



Coordinated production is achieved simply. It's done by a daily telephone call that establishes Melnor's needs for the next two days.

Doehler-Jarvis

Division of
NATIONAL LEAD COMPANY
General Offices: Toledo 1, Ohio
Plants at:
Toledo
Grand Rapids 2, Mich.
Pottstown, Pa.
Batavia, N. Y.

In Canada: **Barber Die Casting Co. Limited**
Hamilton, Ontario

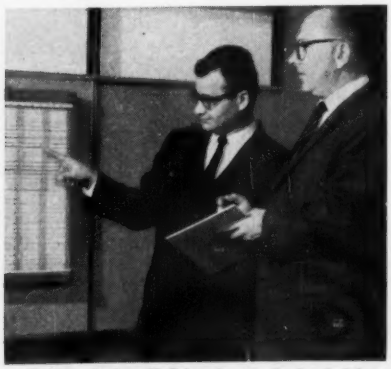
In Brazil: **Industrias Doehler do Brazil, Ltda.,**
Sao Bernardo do Campo, Sao Paulo

Idea exchange starts early! You are looking in on a tough-minded, sharp-pencil work session. At this one, Melnor and Doehler-Jarvis decision makers are setting basic production requirements for a new sprinkler model. During production informal meetings between individual members of this group will keep production moving smoothly.

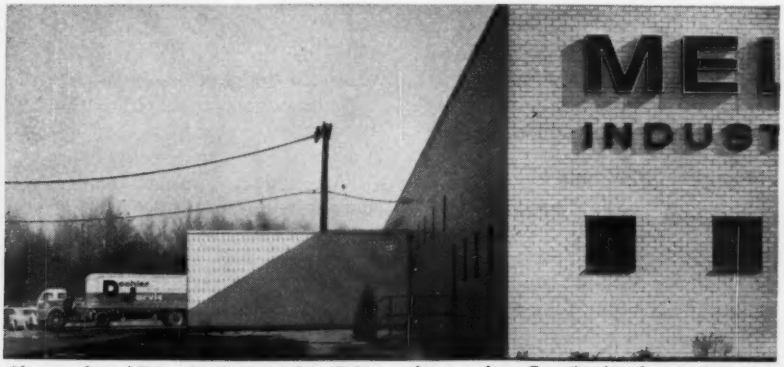
Joint meetings establish production cost limits. Then D-J automates to bring costs within requirements. Ordinarily, automatic tooling is developed and made in Doehler-Jarvis' own shops... as was this 12-station, indexing tool.

Two heads have proved better than one in giving Melnor products durable low-cost finishes, so specialists from both companies confer frequently. D-J both plates and paints. Modern inspection guards finish quality.

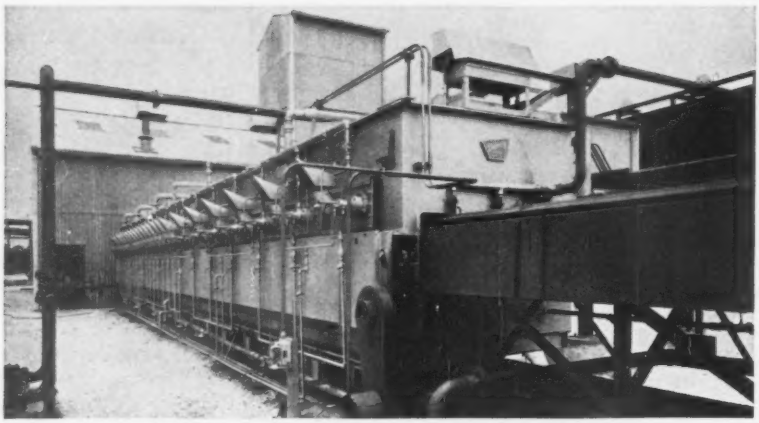
Mutual considerations bring packing innovation. Until recently, D-J shipments went to Melnor in throw-away packages. To save money and time at both plants, D-J engineers designed the money-saving re-use container above.



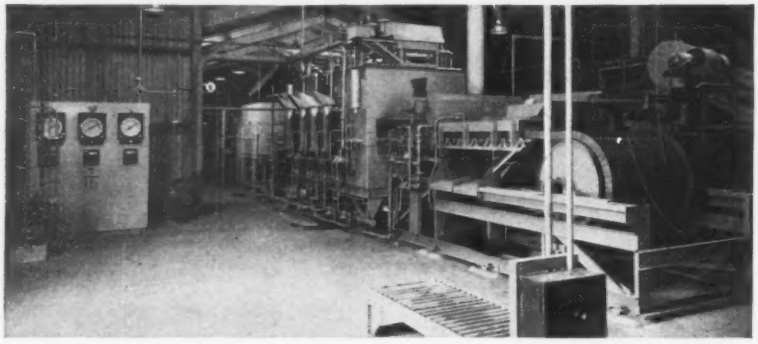
Before closing, D-J has its trucks loaded for the next day's delivery and has started preparing shipments for the succeeding day.



Plant-to-plant delivery is direct and fast. Shipments to Melnor go in one or more of Doehler-Jarvis' own tractor-trailors, arriving early in the morning. Coordination is so close that neither plant is called upon to carry high parts inventories.



Most of nickel briquet continuous sintering furnace is exposed



Loading end (shown) and discharge end are only parts of furnace covered. Panel board (left) shows relative size of unit

Mild Climate Allows Firm To Install Outdoor Furnace

Company saves plant space by placing sintering equipment outside. Only loading and unloading ends are covered. Briquets are turned out at rate of 8800 lb an hour

LOUISIANA's climate permitted Freeport Nickel Co., Port Nickel, La., to install a continuous, in-line sintering furnace outdoors to save space.

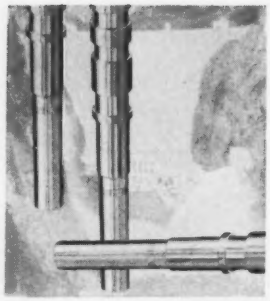
Except for the loading and discharge ends, the entire furnace (156 ft long by 10 ft 4 in. wide) is without cover. Operating control is from a panel board at the charging station.

Built by Drever Co., Bethayres, Pa., the furnace processes Cuban ores into sintered nickel briquets at 8800 lb per hour. The furnace is a radiant tube, natural gas fired, roller hearth type. It's gastight for controlled atmosphere operation.

Materials are conveyed through the furnace on a mesh belt combined with the driven rollers.

The briquets are automatically charged and carried through heating and cooling zones. At the discharge end, the sintered material drops onto a scale where it is weighed and packaged.

The entire operation is under panel control at the charging station. Water used in the cooling operation is recirculated.



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call WESTERN UNION operator 25

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Your J&L distributor can reduce your costs by providing a complete range of pre-production services, and doing it economically! He can save you the capital investment required to maintain long term inventories; he can help you eliminate the costs of overhead connected with stocking, accounting, and the inevitable losses incurred through waste and obsolescence due to specification changes.

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Your J&L distributor is as near as your telephone. Call Western Union Operator 25 for the name of your J&L distributor of Consistent Quality stainless steel.

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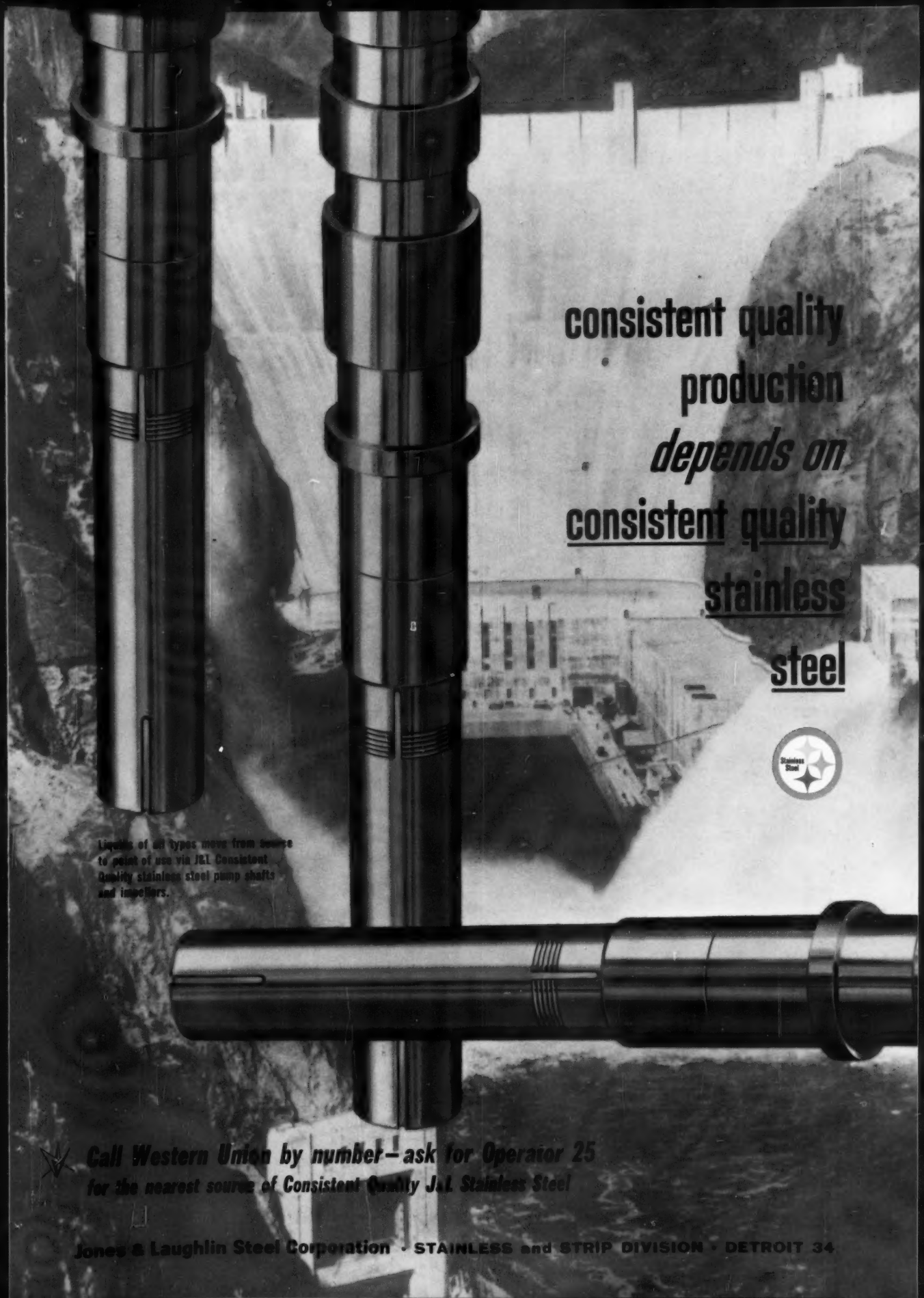
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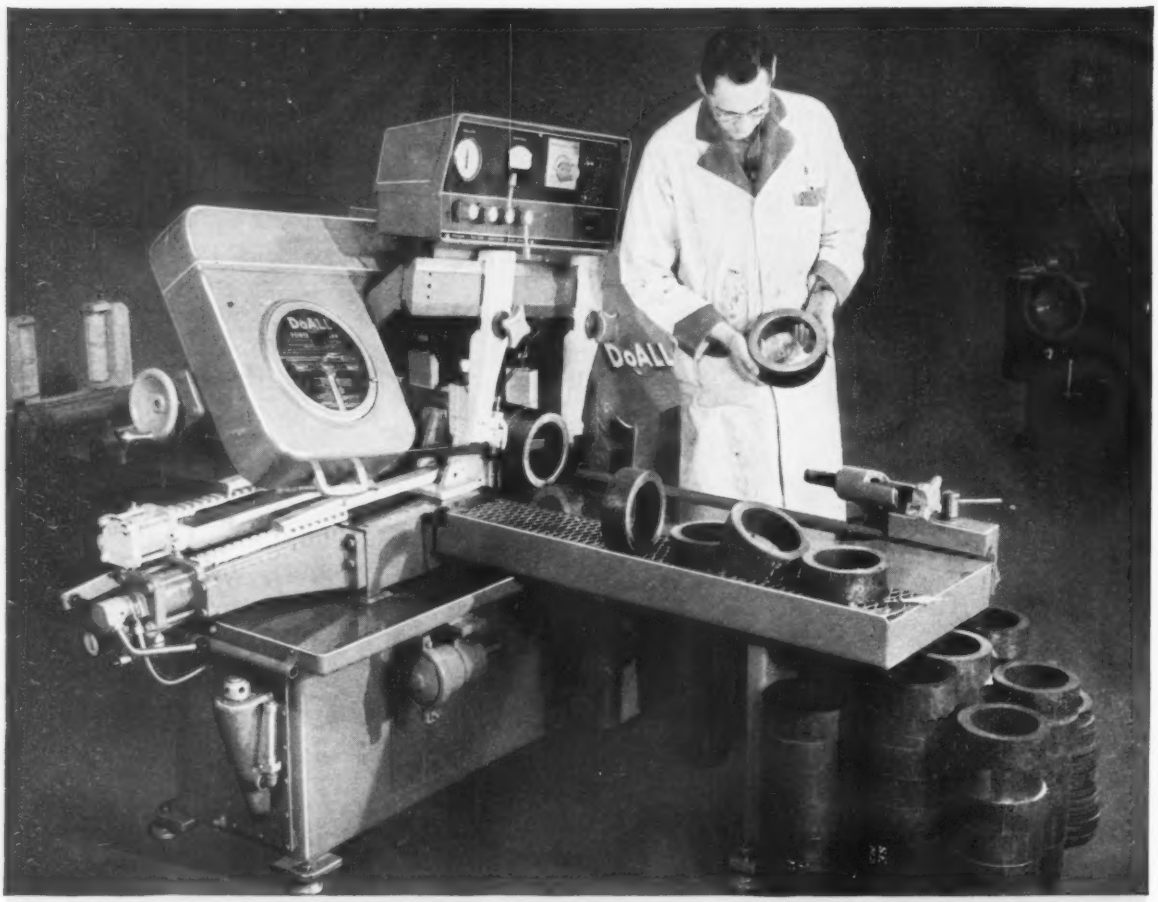


New DoALL Automatic Power Saw Delivers Cutting Accuracy Beyond Compare

Unequaled indexing accuracy and precision cutting are demonstrated by this DoALL automatic power saw. The material: Hot rolled tubing (AISI 3310) pickled, 7.109 in. o.d. with walls .856 in. thick. The cutting "team": A DoALL model C-68 automatic power saw using Demon® h.s.s. saw band and DoALL No. 240 cutting oil.

In all, 192 slices were made—*every one well within flatness tolerance of .014 in.* A total of 3,192 sq. in. was cut with a single saw band—without reconditioning of any kind. The cutting rate was 4.26 min./cut. This remarkable performance proves again that you get the highest productivity with the unbeatable DoALL combination of machine—plus blade—plus coolant.

To users of power sawing equipment these advances mean important new economies in all kinds of cut-off work. Increased cutting rates give you more cuts per hour. Greater accuracy saves time on machining operations.

Call your local DoALL store today and ask a DoALL Sawing Specialist for advice on your own work. He will gladly arrange an in-plant demonstration. There is no cost or obligation.

PS-15

This is a typical DoALL Store

The DoALL Company, Des Plaines, Illinois

Builder Looks at Tomorrow's Machines

In some cases, tomorrow's automatic machines will bear little resemblance to their ancestors. For example: Some machine lines will include casting or forming

THE RISE of flexible automation is likely to be the greatest machining change we'll see in the next ten years, thinks Carl F. Stugard, vice president and general manager, Special Machine Div., Cincinnati Milling Machine Co., Cincinnati.

He feels that flexible automation will be playing as big a role in manufacturing as fixed automation (transfer type) is today in the mass production industries.

"There is no doubt about it; numerical control is the means by which this revolution in automation is going to be achieved," Mr. Stugard said at the annual meeting of the American Society of Tool & Manufacturing Engineers in Detroit.

• What will happen in numerical control?

Mr. Stugard said several important developments will take place in the coming years. Among them:

1. Numerical control systems will become more standardized. "Today, there are many numerical control systems to choose from. These are bound to diminish in number. It is believed that in the next ten years there probably will be a dozen or so compatible systems and tools." There already has been general standardization on the 1 in., eight channel perforated tape. Now the need is for a standard coding language, he feels.

2. Costs of numerical control are likely to drop. Although some of the savings will be credited to control system refinements, Mr. Stugard also anticipates price reductions that will come from quantity production and application of the systems. The demand is already underway. Mr. Stugard says: "A year or so ago everybody wanted to know how it (numerical control) worked. Now people want to know: 'How can I use it?' "

How much will numerical control grow? Mr. Stugard says: "Several manufacturers of electrical control equipment are predicting that half the new machine tools built in the late 1960s will be numerically controlled."

• What will come in transfer type automation?

1. "There is still much that we can do to improve the flexibility and cut down the obsolescence rate of this high production, fixed program automation. Use of the building block concept is one way we can accomplish this. Building block construction of machine tools is just beginning, and for the next ten years, machine tool builders and users will be working to achieve standardization of equipment. . . ."

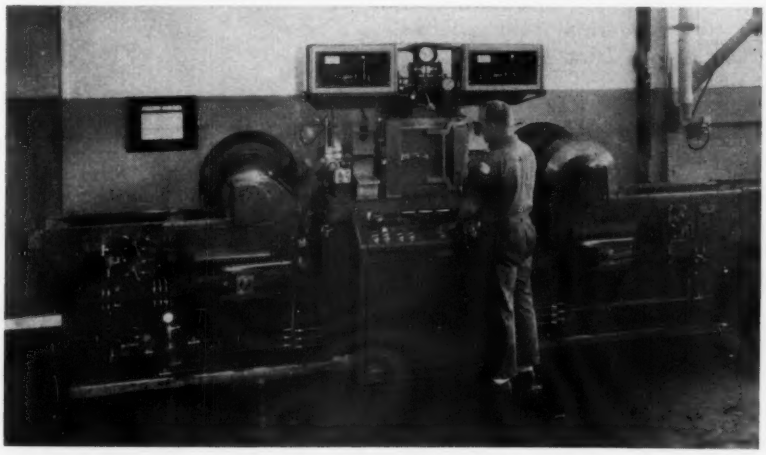
2. There will be a trend toward incorporation of several processes in a single line. "There is no basic reason why a transfer line can't combine casting, forming, finishing and metal cutting stations."

• These trends will affect machine tools in general:

1. Expect more machine rigidity. "Machine tools have been designed with a rigidity on the order of 1 to 2 million psi. The greater precision and power required mean that tomorrow's machine tools may be designed with a rigidity of around 6 million psi and more."

2. The principles of "machine judgment" will be extended. Machines will accept or reject workpieces, depending on what happened at some previous station, and the machine will sort parts into categories after processing.

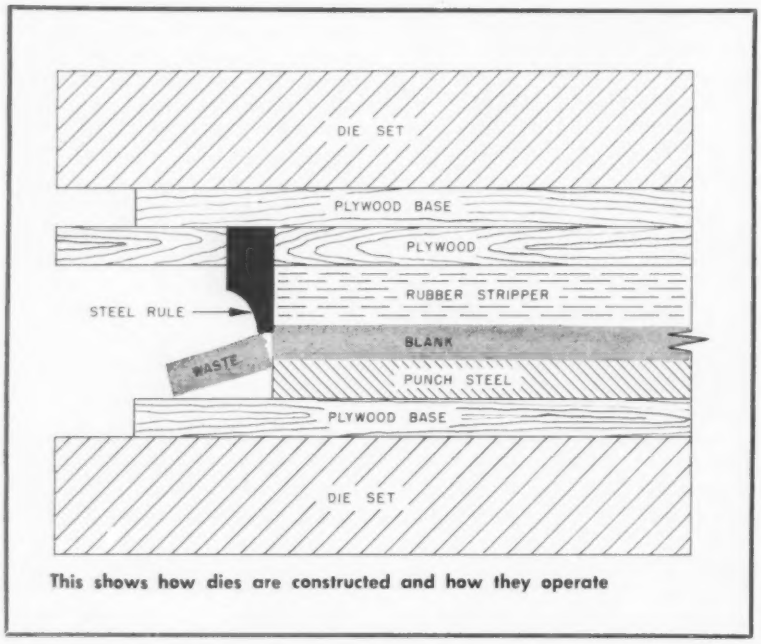
3. Expect more combinations of machine types, says Mr. Stugard. For example: "Transfer machines in which some stations have fixed programs and others have variable programs controlled by tape are easily capable of being built today, and a good many of them will be seen in the future. There is a good chance that these machines may be devoted less to metal cutting than to alternate methods of creating metal shapes . . . for the simple reason that the possibilities of speeding up the alternatives are greater than the possibilities of speeding up cutting itself."



THIS SENDZIMIR MILL puts a fine finish on high temperature alloy and stainless steel foil at Rodney Metals Inc., New Bedford, Mass. It has electronic tension control and rolls 0.0002 in. thick material to a tolerance of ±3 per cent

Steel Rule Dies Bid For 'Long Run' Status

Casting off the "temporary" label, such tools have run up records of more than 3 million parts, states Cleveland engineering firm. They're useful for short runs too



This shows how dies are constructed and how they operate

STEEL RULE DIES no longer are considered just a stop gap or a temporary production tool. Such dies are important, full-time performers in modern industrial tool kits. Firms like General Motors Corp., Detroit, General Electric Co., Schenectady, N. Y., and Radio Corp. of America, Camden, N. J., make or buy such tools regularly.

Rulco Engineering Inc., Cleveland, makes nothing but steel rule dies. It turns out between 300 and 500 of them a month. Its president, Russel J. Tobey, claims these advantages: Low initial cost; low operating cost; low piece cost; several blanking and piercing operations can be done in a single stroke; one die set can be used for many steel rule dies; the method helps ease shortages of skilled tool and die makers.

Prime beneficiaries, declares Mr. Tobey, are those who employ such dies for producing prototypes (like auto, truck, farm equipment, and electronic components). They comprise the major part of Rulco's output.

• Such tools are being used more and more for long run applications. Two and a half years ago, a farm implement firm purchased such a die to blank chicken feeder parts in galvanized metal. It expected to run 20,000 parts. Three million pieces later, it's still running.

The reason for such long life, states Mr. Tobey, is that properly designed steel rule dies don't cut the metal—they use a glass cutting or breaking principle. The rule comes down on the blank and penetrates a short distance. The waste splits away like glass, studies have revealed. That's the reason Rulco favors brittle raw materials rather than soft ones like copper or some grades of aluminum. (Use of sheets thinner than 0.012 in. is not recommended.)

By comparison, the punch on a conventional die will penetrate about 20 per cent of the blank material, breaking into the female section slightly. Also, clearances between punch and female are maintained at about 10 per cent of the blank thickness so there is some rounding over, creating a slight burr.

Compared with previous methods, steel rule dies saved 24,000 strokes annually on grain chute support (top), 28,000 strokes on support bracket for cotton picker (center), and 800,000 strokes on Firestone sign

In the steel rule die, no clearance is maintained between punch and rule. In a ⅜ in. blank, for example, the rule penetrates about 0.028 in. Lack of clearance permits the rough, cut edge of the waste to slide by the punch—a cleaning and sharpening action which greatly reduces maintenance.

What's the upper thickness limit? Only the press size and the practicability of forming the steel rule limit blank thickness. "Most people will tell you that ¼ in. is about the thickest metal that can be handled, but we have cut metals considerably heavier," states Mr. Tobey.

Another point to remember: Strength of the steel rule must exceed the yield strength of the material being blanked.

• Observing the limitations of steel rule dies will eliminate many problems. Failure to observe them has unnecessarily caused many to abandon the idea.

One problem often encountered by Rulco designers is the widespread idea that steel rule dies are cheap. In a sense they are, but good steel rule dies cost more and far outperform those which are cheaply made. For example, we strongly recommend the use of a precision mastered die set to assure alignment —no clearance exists between male and female sections, so the greatest care and accuracy is necessary to insure die life," declares Mr. Tobey.

Another word of caution: Small parts are extremely hard to handle. Stripping them is difficult (there's not enough rubber area to push it out of the female section) and it's hard to feed the blanks. That's because the "daylight" clearance between top and bottom halves is so small.

Greatest benefits accrue from the larger sizes.

"Better stick to parts which are larger than 6 in. square," is Rulco's advice.

Have you entered

STEEL's Usership Idea Contest?

Pages 5 and 6.

New Unit Speeds Cleaning

A NEW sandwich-type transducer is expected to give ultrasonic cleaning systems greater power and efficiency. It has just been introduced by Branson Ultrasonic Corp., Stamford, Conn.

Thin sections of lead zirconate titanate are sandwiched between lead and steel. The ceramic has not been used up to now because it is difficult to manufacture in heavy sections, and, as a raw material, is more expensive than the commonly used barium titanate.

• Faster Cleaning—The new transducer (tradename, Sonogen Z) operates at 25 kilocycles (kc). Because it can convert larger amounts of power than the barium titanate transducer used with 40 kc systems, it may be operated as a full wave system, doubling the effective power per unit areas, says Branson.

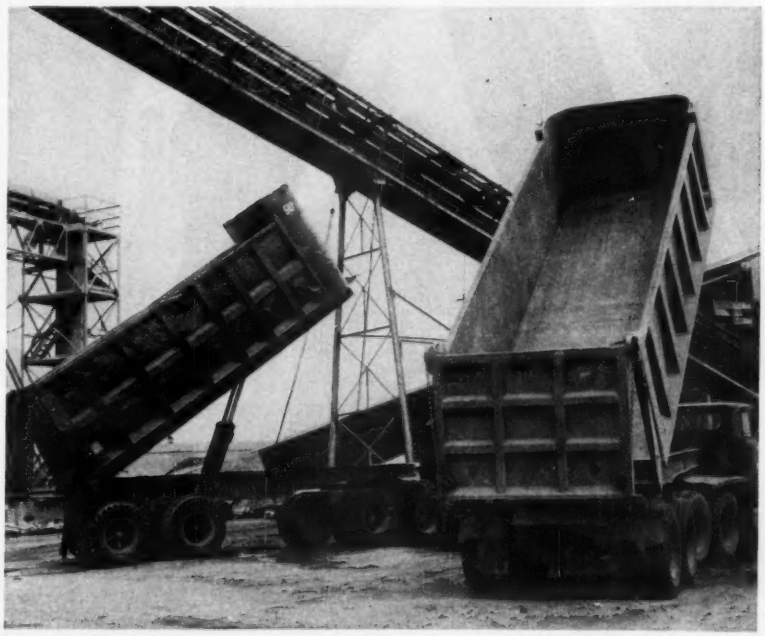
Because standing wave effects are more pronounced with 25 kc equipment, parts to be cleaned should be moved about for optimum results, caution Branson engineers.

• Overcomes Limitations—Some of the unit's characteristics: About 90 per cent efficiency; high operating temperatures (200° F); and flat tuning characteristics which reduce the necessity for close frequency control of the generator.

Because of their construction, Sonogen Z elements can be reclaimed from a transducer housing which has deteriorated due to cavitation erosion.

Branson says older style transducers generally have to be replaced after 7000 to 10,000 hours of operation and that the cost of repair is about 80 per cent that of the new unit. The stainless steel housing of Sonogen Z can be replaced at about 20 per cent of initial cost.

The new system does not obsolete those using barium titanate or magnetostrictive transducers, explains Branson.



BOTH TRUCK BODIES ARE 18 MONTHS OLD. (They're used to haul hot slag 24 hours a day.) Body on right was fabricated from high strength, abrasion resistant steel, called N-A-Xtra. Carbon steel body (left) must be replaced. On top of that: Cost to maintain it during period was equal to original cost. Quenched and tempered N-A-Xtra costs more than carbon steel, but Edward C. Levy Slag Co., Detroit, expects to save $100,000 a year in operating and equipment costs by using the material in its 40 unit fleet. The alloy is made by Great Lakes Steel Corp., Detroit, a division of National Steel Corp.

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Horizontal, High Speed Press Uses Special Feed

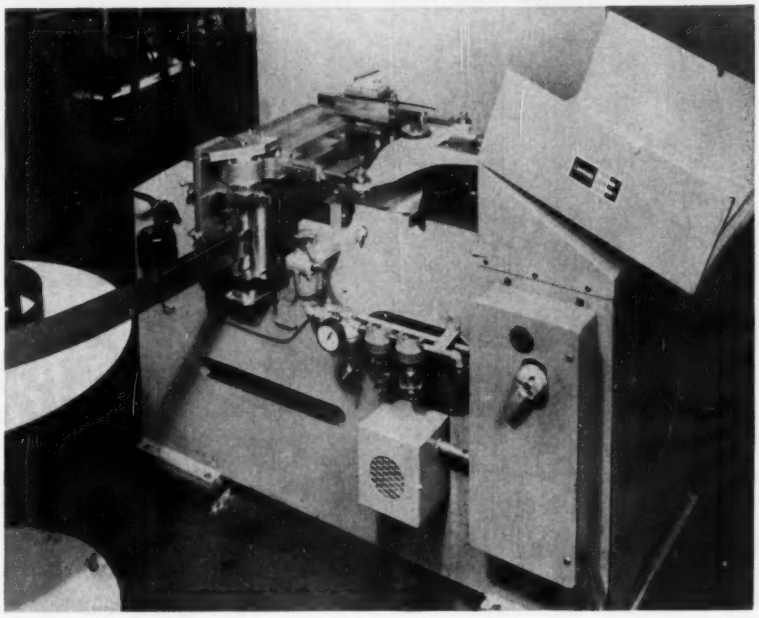
THIS 25 TON horizontal press can handle light gage metals and non-metallic materials at speeds over 1500 strokes a minute. It has a specially designed feed.

The unit (54 x 40 x 25 in.) has a vertical crankshaft with the flywheel and clutch in the base of the machine.

The double roll feed is rack driven from a walking beam tilted by an eccentric from the top of the press-shaft. It can handle material 6 in. wide and up to a 4 in. feed length. Roll releases are air operated.

The horizontal design provides a low center of gravity for stable operation at high speeds. Placing the flywheel in the bottom of the press helps to distribute vibration.

For further information, *write* Hudson Div., Emhart Mfg. Co., 1937 Union Turnpike, Hudson, N. Y.

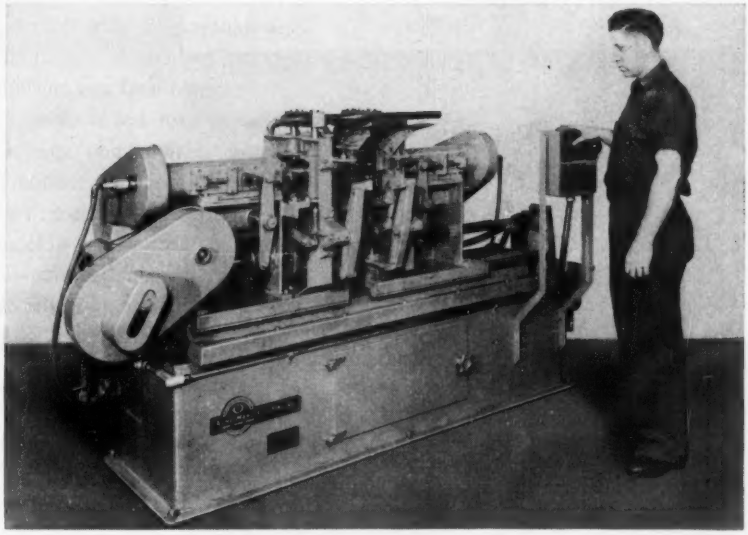


Machine Deburrs Different Diameters, Lengths

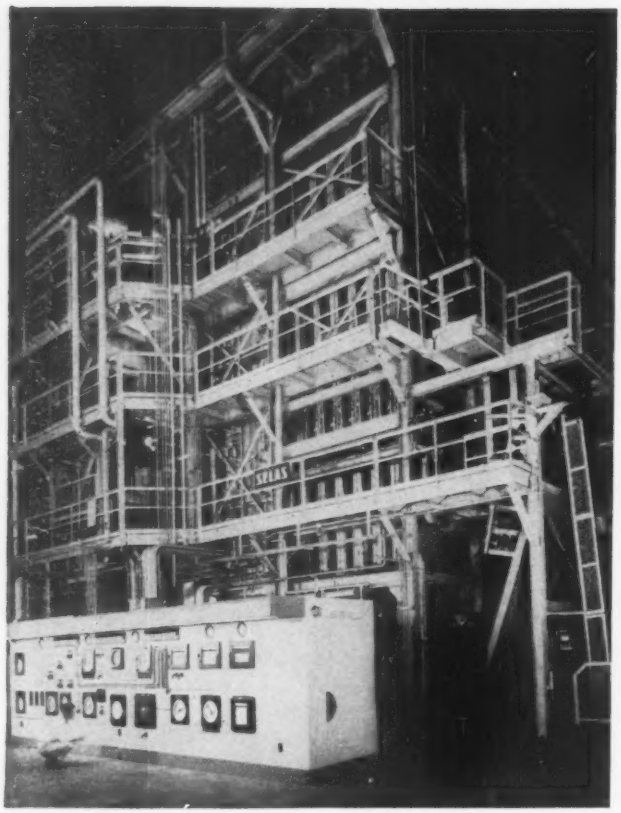
HERE IS a versatile, high production double end deburring machine that automatically chamfers the inside and outside diameters and face of tubular steel parts.

Tubing from ¾ to 2¼ in. in diameter and from 2½ to 24 in. long can be deburred at production rates up to 6000 pieces an hour. The fixtures permit rapid tool changes from one tube diameter to another.

A variable speed, program shaft extends the entire length of the machine and synchronizes all automatic operations. Tubes are manually loaded into a vertical magazine. A walking beam mechanism automatically transfers the tubes from the magazine to the work station chuck jaws and ejects finished tubes from the machine. An eccentric cam mechanism automatically opens and closes the chuck jaws during transfer operations.



The machine requires a floor space of 3 x 9 ft. It's 4½ ft high. Two 2 hp, 1800 rpm electric motors power the spindles. The program-



Here's how the Steel Industry

STRIP is continuously bright-annealed in this single-pass, direct-fired furnace. Designed for fast, uniform heating, Gradiation strip lines are compact, easy to install, simple to operate, economical to maintain. This concept of strip heating is also used for annealing of stainless steel, tin reflow, galvanizing-annealing, blueing, preheat for galvanizing and annealing.

The versatility and adaptability of Selas Gradiation® heat processing—throughout the steel industry—is demonstrated by the diversity of applications shown in the accompanying photographs.

Gradiation is a concept and technique of heat processing which coordinates fast, controlled heating with the nature of the workpiece . . considering its composition, size, shape, heat transfer characteristics and physical properties . . to develop desired product quality, in minimum time, with maximum efficiency, and with the use of automated and compact equipment.

Designed and custom-built to meet your specific heat processing needs . . for hot working . . galvanizing . . tinning . . heat treating heavy sections and special shapes . . Gradiation equipment contributes production economy, high production rates, ease of handling.

At your convenience . . without cost or obligation to you . . a Selas field engineer would welcome the opportunity to survey your needs. For this personal service—or for a copy of our new Bulletin "Selas Gradiation Heating in the Steel Mill"—write to Mr. R. E. Buckholdt, Mgr. Furnace Division, Selas Corporation of America, 25 Dreshertown Road, Dresher, Pa.

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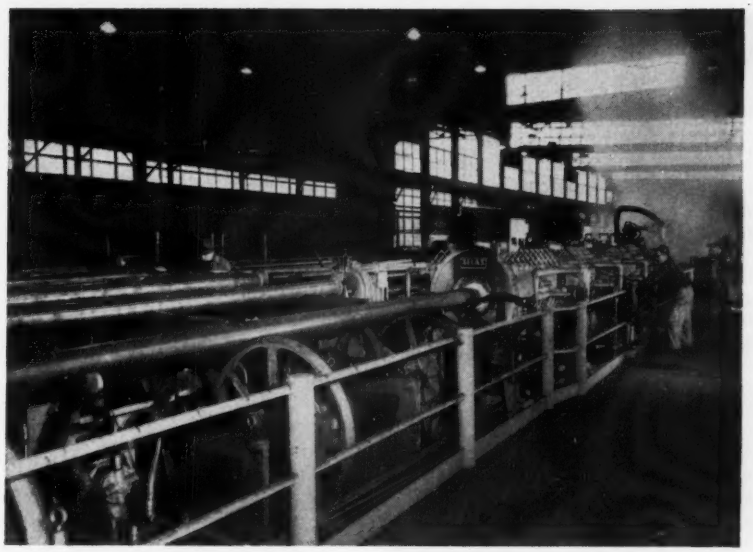
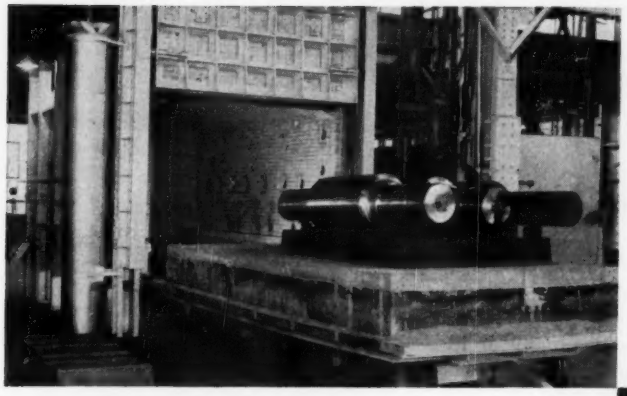
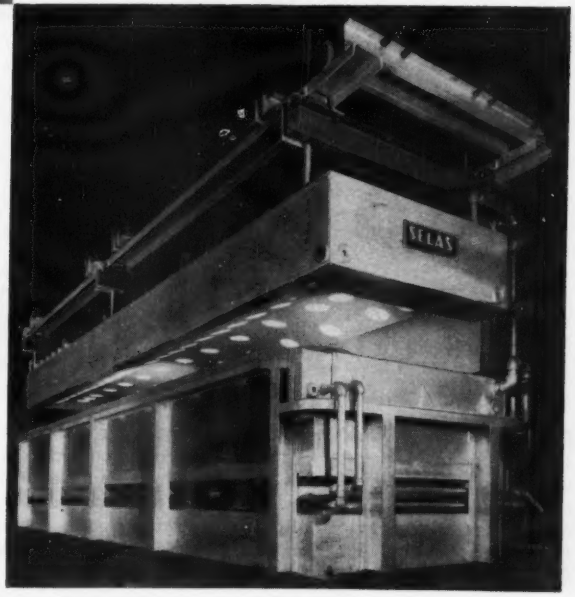


SEAMLESS TUBING is hardened and tempered in this Selas barrel-furnace line to produce oil-well casing for the petroleum industry. The pipe is heated to 1600°F in five barrel furnaces, quenched by an annular water spray unit, then tempered in succeeding five barrel furnaces. Rotation of the pipe during its forward motion (during heating and cooling) assures uniformity of metallurgical properties and straightness. Pipe 5 in. to 9⅝ in. O.D. is handled in this completely automated line.

uses SELAS Heat Processing



CAST-STEEL ROLLS and other alloy steel castings are annealed in this Gradiation-fired car-bottom furnace, at Ohio Steel Foundry, Lima, Ohio. Preciseness of control and uniformity of heating enables prescribed time-temperature cycles — required in processing the sensitive cast-steel structures — to be followed.



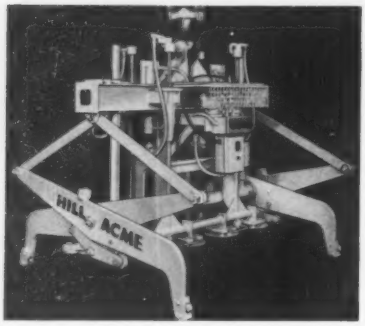
TUBE-ENDS are heated for upsetting (for subsequent threading) in specially-designed Selas slot-type furnaces. As each tube-end is fast heated to upsetting temperature, the tubing automatically moves down the handling table to the upsetting machine. The direct-fired Duradiant® gas burners are patterned to assure temperature uniformity within a controlled section of each tube-end.

shaft which controls automatic operations is powered by one 1 hp, 1800 rpm unit.

For further information, *write* Acme Mfg. Co., 1400 E. Nine Mile Rd., Detroit 20, Mich.

Sheet, Billet Lifter Has Automatic Tong Action

SINGLE SHEETS, slabs, billets, or ingots can be handled by the combination lifter made by Hill Acme Co. Multiple vacuum cups or scissors tongs are used as required.



Tong action is automatic. The face of the material being handled is protected by supporting rollers attached to the tong arms. The frame supporting the vacuum cups is actuated by air cylinders controlled by a solenoid valve. The lifter vacuum system has a motor, pump, and vacuum reservoir.

You can get sizes and capacities to fit your requirements. The unit shown has a tong capacity of 8000 lb and a 1200 lb vacuum lift capacity.

For further information, *write* Hill Acme Co., 1201 W. 65th St., Cleveland 2, Ohio.

Tapping Head Doesn't Use Reversing Motor

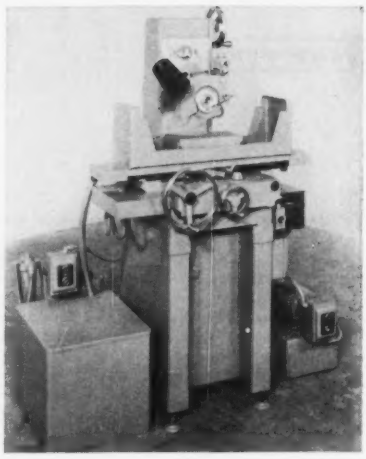
YOU CAN do multiple spindle, simultaneous tapping in short cycle time (without a reversing motor) with a tapping head developed by Zagar Inc. Threading holes with 8/32 in. taps in a 2 second cycle, 50 holes per pass, is possible with this design.

A triple electric clutch and brake assembly in the gearbox permits the motor to drive forward continuously through the flywheel and reverse gearshaft. A lead screw controls the feed in and out of the terminal strip. The company says the compact head can easily be installed on standard drill presses.

For further information, *write* Zagar Inc., 2400 Lakeland Blvd., Cleveland 23, Ohio.

Hand Grinder Doubles in Toolroom or Production

HYDRAULIC table control is available on the Model DH-612 hand grinder. Operated manually or hydraulically, it can double on toolroom or production runs.



Machine height is adjustable and the handwheel can be used on the left or right side of the saddle.

For further information, *write* DoAll Co., 256 N. Laurel Ave., Des Plaines, Ill.

Production Buttwelder Has Built-in Actuator

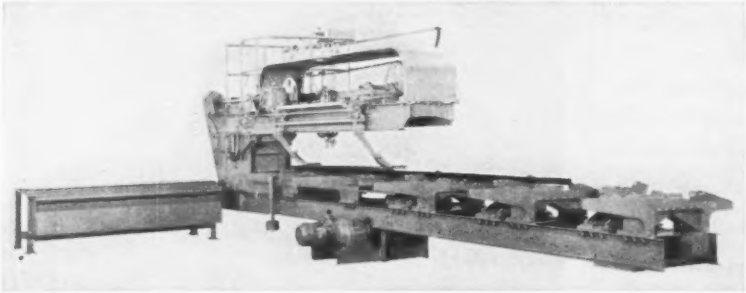
PRECISION alignment of parts is maintained by the Model B10 buttwelder. Clamping jaws are actuated by individual air cylinders to assure

positive clamping action. Upset pressure is also air operated. You have complete control of upsetting pressure and degree of upset.

The motion of the movable jaw is straight-in-line. A noncritical automatic welding actuator in the unit eliminates the air pressure switches used on previous machines.

Welding procedure: Set the jaw clamps for the thickness being welded; set the current control switch for the heat required; and start welding.

Standard equipment includes two air pressure regulators (with individual gages and air line oilers), air



FOR MARKING BARS AND PIPE, this automatic stenciling machine can handle sections up to 21 ft long. Pipe handling is automatic from entry skids to discharge point. Walking beams operate from a variable drive with a 4:1 speed range. The stenciling is interlocked with the pipe handling. Traveling spray guns mounted at a proper height above brass stencils minimize overspray. For further information, **write** Northeast Ohio Machine Builders Inc., P. O. Box 367, Columbiana, Ohio

Combining corrosion resistance,
exceptional structural strength,
hardness, and wear resistance:

ASARCON® NI-VEE* BRONZES

The unusual strength, exceptional hardness and excellent wearability of these continuous castings of Ni-Vee copper alloys are still further increased by simple heat treatment. Asarcon Ni-Vee castings are highly qualified for rugged heavy duty service, especially where corrosion is a problem. They are available as rods, tubes, and special shapes, in lengths up to 20 feet, diameters from 13/32" to 9⅛", only 1/32" away from finished dimensions. And they are guaranteed to be free of porosity, sand inclusions, and blow holes. For further information, write to Continuous Cast Department, American Smelting and Refining Company, Barber, N. J. or Whiting, Ind.

*NI-VEE is a registered trademark of International Nickel Company.

ASARCO

AMERICAN SMELTING AND REFINING COMPANY

One of the 20-foot continuous-cast Asarcon Ni-Vee gate stems for sluice gates at Lockport, Ill. powerhouse flood control project.

CONTINUOUS CAST DEPARTMENT

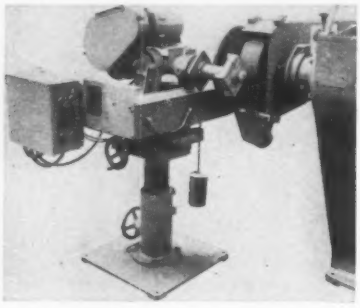
West Coast Distributor: Kingwell Bros., Ltd., 457 Minna Street, San Francisco, Calif. In Canada: Federated Metals Canada, Ltd., Toronto and Montreal. Distributors in many principal cities.

line filter, and one set of clamping jaws and welding dies.

For further information, *write* Peer Inc., 1200 Milton St., Benton Harbor, Mich.

Work Holding Machine Has Automatic Cycle

MANY different shapes, including round parts up to 14 in. in diameter, can be handled by the Hammond work holding machine. The unit (Model EPC) is automatically cycled.



The preset timer permits work to dwell at the finishing wheel for periods up to 1 minute. Then the work is automatically retracted by air to load-unload position and the work spindle stops. Weight can be varied to obtain correct finishing pressure. Cams are designed for each workpiece and the finishing requirement.

The vertical column has an 8 in. adjustment, and two cross slides with 7 in. of travel position the work to the wheel. You can get accessories such as work holding arms, an oscillating slide, and a variable speed spindle drive. The unit weighs about 1000 lb.

For further information, *write* Hammond Machinery Builders Inc., 1600 Douglas Ave., Kalamazoo, Mich.

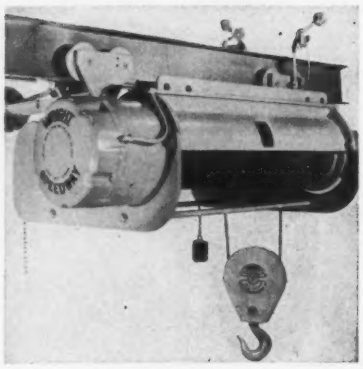
Geared Trolley Hoist Has 12,000 lb Lifting Capacity

AN ELECTRIC hoist (Speedway Frame 3) has a lifting capacity of 12,000 lb and a headroom of only 4 in. The geared trolley unit has a long lift of 115 ft and a lifting speed of 20 fpm.

You can use it on a 7 ft radius. On a curve, the hoist is offset from its normal operating position and uses a concrete filled cylinder on the opposite side of the monorail as a counterbalance.

The expanding jaw type motor brake is solenoid operated. It's effective for load spotting. A fan shaped wheel induces air throughout the braking area.

The load sustaining members are made of steel and have a 5:1 safety factor. The ball bearing type motor (7.5 hp) is designed to NEMA specifications and is rated on a 30



minute duty cycle with a temperature rise not to exceed 131° F over ambient. It's built for 220 volts, 60 cycles, 3 phase or 440 volts, 60 cycles, 3 phase (by reconnecting the terminal leads). One, two, or variable speed motors can be furnished.

For further information, *write* Wright Hoist Div., American Chain & Cable Co. Inc., York, Pa.

Weldments to 120 Tons Handled by Positioner

HEAVY DUTY, geared elevation head and tailstock positioners have been developed for positioning weldments such as freight and piggyback cars for downhand welding. You can select capacities from 6 to 120 tons.

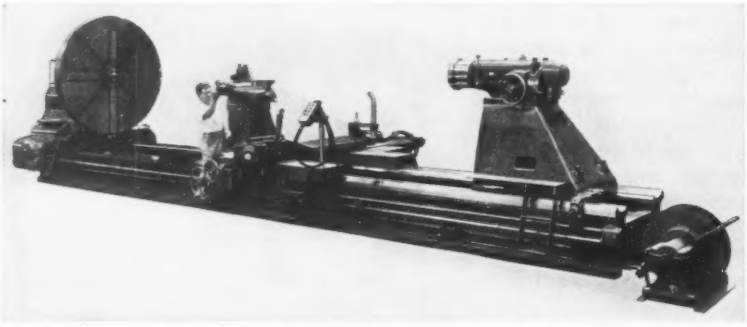
A low, horizontal axis height keeps the weldment near the floor, while the elevation feature provides clearance for indexing. All models have hollow spindles for the passage of cables, gases, or fixturing. Accessories are available.

For further information, *write* Aronson Machine Co., Inc., Arcade, N. Y.

Welding Machines Can Use Any Shielding Gas

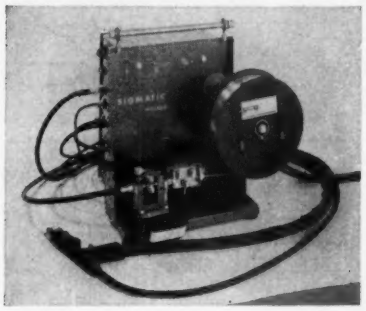
CONSUMABLE electrode, inert gas welding can be done with the Sigmatic line of welding machines. Three mountings are available: SWM-11 (frame type), SWM-12 (sled type), and SWM-13 (cart type).

The units can use any shielding gas. Popular wire diameters (solid or cored) can be handled by the wire feed units. Torch designs are available in ratings from 200 to 500



MEDIUM DUTY ENGINE AND TRACER LATHE handles work up to 40 tons making precision cuts to 3/4 in. deep. Four sizes with swings from 74 to 108 in. over the bed are available. The bed is 56 in. wide with four hardened and ground replaceable V-ways. Standard equipment includes a carriage mounted power unit and motor, hoses and fittings, hydraulic tracer valve, angle tracer slide with hydraulic actuating cylinder, periscope type optical viewer, template holder brackets, and adjustable supports for flat templates. For further data, **write** American Tool Works Co., Pearl Street at Eggleston Avenue, Cincinnati 2, Ohio

NEW PRODUCTS and equipment



amperes for continuous fusion welding (spray arc or short arc) or spot-welding.

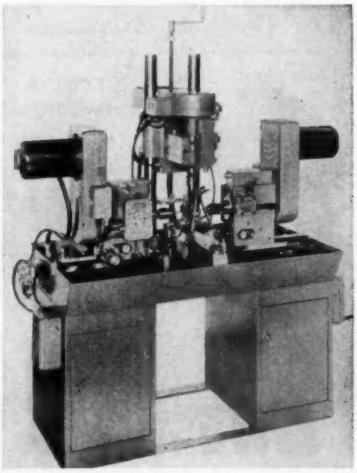
The electronic controls (designed for constant-potential power source) are easily converted to use conventional power supplies. Optional control features include a wire feed delay until the arc is struck and continuous operation without depressing the torch trigger.

For further information, *write* Linde Co., a division of Union Carbide Corp., 30 E. 42nd St., New York 17, N. Y.

Triple Spindle Unit Has Individual Drive Motors

AN AUTOMATIC triple spindle machine speeds production of secondary operations on screw machine and headed parts, diecastings, stampings, and molded plastic parts.

The machine has two horizontally opposed spindle units and one vertical spindle unit. Each unit can be cycled individually and automati-



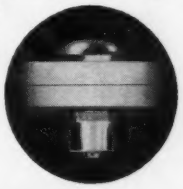
Townsend Lockbolts now available in Stainless Steel for greater strength ...corrosion resistance

If you need extra strength in fastening your assembly—plus corrosion resistance—you can get both now with Townsend 18-8 stainless steel lockbolts.

The use of Townsend stainless lockbolts gives you greater flexibility of design and the values are highly uniform. There is no chance for human error in setting lockbolts. Men with no special training get strong, vibration-proof joints every time.

Townsend stainless lockbolts are vastly easier to install—for example, they eliminate the back breaking work of bucking stainless rivets which work-harden rapidly.

Townsend lockbolts are also available in carbon steel and aluminum alloy in a wide range of diameters and grip lengths in brazier, button and 90° countersunk head styles. Write today for information to Engineered Fasteners Division, P.O. Box 71-C, Ellwood City, Pennsylvania.



Licensed under Huck patents RE 22,792; 2,114,493; 2,527,307; 2,531,048; 2,531,049 and 2,754,703

Townsend Company

ESTABLISHED 1814

Engineered Fasteners Division

ELLWOOD CITY • PENNSYLVANIA

Cherry Rivet Division • Santa Ana, California

cally in any combination with the other two units. Each unit has an individual spindle drive motor with speeds ranging 500 to 10,000 rpm. Dovetail mounting permits an 11 in. major adjustment of individual heads plus 2½ in. of spindle stroke control.

The unit can do drilling from 0.020 to 0.375 in. and tapping to 0.375 in. in mild steel.

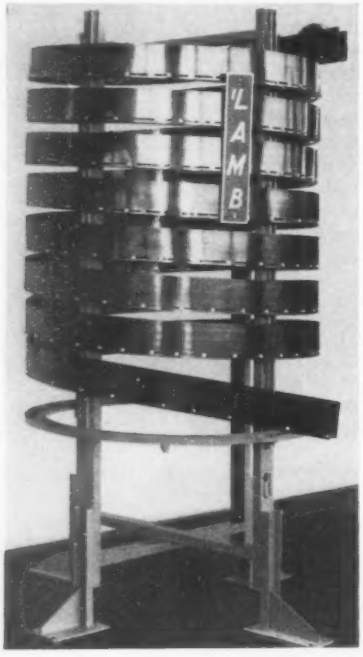
For further information, *write* Universal-Automatic Corp., 9545 Ainslie St., Schiller Park, Ill.

Storage, Lowering Unit Feeds Rolling Parts

THE HELICAL storage and lowering unit developed by Fabri-Tech can be used in automatic part handling for production of parts such as pistons, bearings, blanks, and others with rolling or sliding characteristics.

Applications include storage or banking of parts at machine input or output to assure adequate supply of work to automatic processing equipment. It can also be used to slow down gravity fed parts.

Storage capacity (height and diameter of coiled chute) is dependent on part size. Chuting configuration



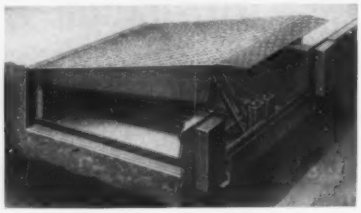
is made to suit part dimensions. The maker says it can easily be reworked to accommodate part design changes.

Drive and control mechanisms aren't required, but electrical part flow control and machine interlocks are available as optional equipment. Floor or suspended models are available.

For further information, *write* Fabri-Tech, a subsidiary of F. Jos. Lamb Co., 5663 E. Nine Mile Rd., Detroit 34, Mich.

Dock Leveling Ramp Has 6 X 8 ft Platform

A SPRING counterbalanced dock leveling ramp made by Globe Hoist Co. can be installed in a dock recess measuring 86¾ x 74 x 24 in. It's operated manually. Platform size is 6 x 8 ft (that includes the



hinged lip section). Lip travel is 11 in. below to 30 in. above dock height. Sustaining and rollover loading supporting capacity: 20,000 lb.

When not in use the ramp is horizontally locked to the level of the surrounding dock area. The hinged lip section points straight down, propped against a support bracket on the frame. To actuate the ramp, the operator trips the release mechanism by means of a cord.

For further information, *write* Industrial Lift Div., Globe Hoist Co., E. Mermaid Lane at Queen Street, Philadelphia 18, Pa.

Electronic Precipitator Removes Oil Mist, Fumes

WITH THIS electronic precipitator, you can eliminate oil mist and fumes from operation of such equipment as machine tools and welding booths. The compact unit has a blower, a filter, and an electrostatic precipitator.

Coolants from machine operations can be returned for re-use. Air ex-

THE HOUGH LINE

COOLANTS FOR METALWORKING

HYDRAULIC FLUIDS AND PACKINGS

CLEANERS

RUST PREVENTIVES

QUENCHING OILS & HEAT TREATING SALTS

DRAWING COMPOUNDS

SPECIALTY LUBRICANTS

ON-THE-JOB SERVICE

HERE'S PROOF

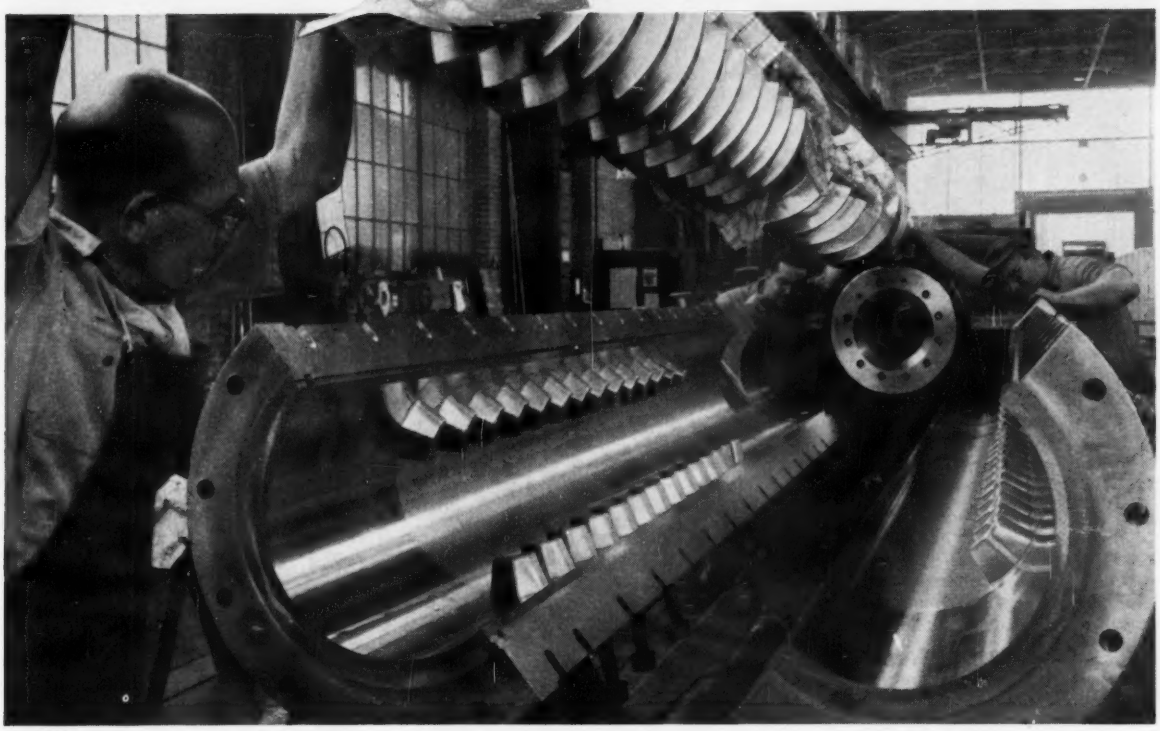
...New 100% Chemi-Cool HOCUT

...cools

...lubricates

...prevents rust

...stays mint-fresh for life!



A manufacturer of bakery and chemical mixing equipment was having constant trouble in machining stainless steel components like these.

First, the coolant had to have the "guts" to handle stainless—grades 17-4 PH and 316. A close look at these parts being assembled will reveal the fine finish obtained.

Their biggest problem, however, was rancidity. At least once a week — sometimes twice — they previously had to dump their 800 gal. central reservoir. This cost money!

They tried Hocut 237. The reservoir was filled with a 50:1 dilution and the machines started up—*and they're still using it!* Make-up solution is all they've added since last year!

Try Houghton Hocut—it cools, lubricates, prevents rust and—STAYS MINT-FRESH FOR LIFE! E. F. Houghton & Co., 303 W. Lehigh Avenue, Philadelphia 33, Pa.

Industry's Partner in Production

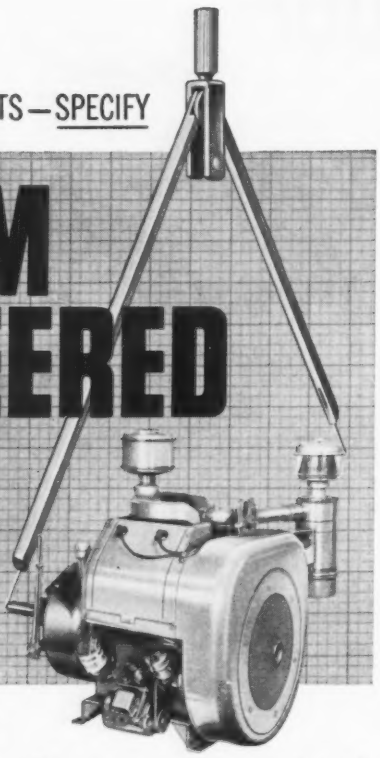
E. F. HOUGHTON & CO.

Philadelphia, Pa. • Chicago, Ill. • Carrollton, Ga.

Detroit, Mich. • San Francisco, Calif. • Toronto, Canada

IF YOU WANT TO SHAVE
TIME AND COST ON YOUR
ENGINE-DRIVE POWER PROJECTS—SPECIFY

CUSTOM ENGINEERED POWER BY WISCONSIN



DRIVE TRAIN: specify your choice of centrifugal clutch; over-center clutch; clutch reduction or reduction assembly in a variety of ratios; adaptor to take a spring-loaded clutch or transmission-torque convertor designs.

DIRECT DRIVE: a crankshaft extension to meet your special needs. It's available threaded, tapered, splined, special diameters and lengths, various keys, etc., for close-coupled pumps, generators, and many other machines.

SPEED REGULATION: available in a broad range of governor controls, hand-operated, remote wire-and-lever controls; 2-speed agricultural controls (idle and load speeds) and special provisions to mount controls of your own design.

FUEL SYSTEMS: gasoline, natural gas and LPG (for domestic applications) and alcohol, kerosene, and No. 1 fuel oil (for export).

HYDRAULIC POWER: all Wisconsin V4's can be equipped with integrally-mounted hydraulic pump.

ELECTRICAL EQUIPMENT: electric starter-generator or starter only available for all Wisconsin models, 3 to 56 hp. Solenoid switches and automatic choke, for remote or automatic starting are also available.

SAFETY DEVICES: low oil pressure cut-off switch for 2- and 4-cyl. engines, and high temperature safety switch for all models.

MISCELLANEOUS ACCESSORIES: automotive and spark-arresting mufflers, pre-cleaners, drive pulleys for flywheel, and rewind starters for ACN and BKN engines.

Do you want to see over-all development time and costs drop to management-applauding levels? Then consult Wisconsin *early* in your power-plant design stages.

Wisconsin's unique custom-engineered service provides these two reasons why:

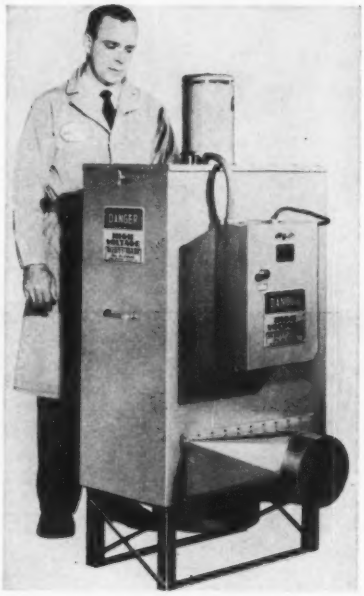
First, its unequalled range of options — covering basic specifications, accessory groupings, and drive variations — permits modification of any production-model engine to meet most installation requirements precisely and economically.

Second, for tougher re-design problems, its engineering counsel draws on more than 50 years of engine specialization to build the perfect partnership between your needs and time-tested features of Wisconsin reliability.

So, if you have a new engine-powered machine on your board, it will pay you to call Wisconsin in the early stages of planning. Send for Bulletin S-249 giving technical details on the complete heavy-duty air-cooled line — 3 to 56 hp. Write Dept. O-30.

WISCONSIN MOTOR CORPORATION
MILWAUKEE 46, WISCONSIN
World's Largest Builders of Heavy-Duty Air-Cooled Engines

NEW PRODUCTS and equipment



hausted from the unit (called Misti-Maze) is recirculated to the shop to reduce heating or air conditioning costs.

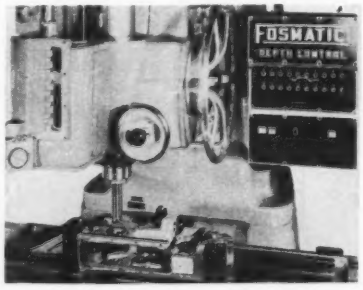
Installation requirements include an electric power connection, drain, and ductwork to the work area. Sizes rated at 600 or 1200 cu ft per minute are available.

For further information, *write* Air-Maze Corp., 25000 Miles Rd., Cleveland 28, Ohio.

Numerical Depth Control Added to Boring Machines

NUMERICAL depth control is available for Models 44 and 54 Fosmatic precision boring machines. It adds the third automatically controlled dimension to precision boring.

Equipped with Fosmatic numerical positioning (x and y axes) and depth (z axis) control, the machines



become more versatile and are especially suited for small lot boring jobs requiring accuracy to ±0.0001 in.

All control hardware and circuitry mounts on the machine and within the standard Fosmatic numerical control console. No extra cabinets are needed. Floor space is unchanged. Accurate depth programing is easy. It's only necessary to know tool length to the nearest ½ in.

The company says tool compensation takes only about 1 minute per tool, and is performed only once, to a zero reference. Gages are mechanically aligned by an electric drive.

Manual depth setting is accomplished by a series of direct reading dials which mechanically stack the gages.

When under manual pushbutton or tape control, the tool moves at a rapid approach rate to within 0.050 in. of the work surface, and then automatically changes to the required feed rate.

For further information, *write* Fosdick Machine Tool Co., 1600 Blue Rock St., Cincinnati 23, Ohio.

Two Part Adhesive Has 18 Hour Mixed Working Life

A VERSATILE, two part adhesive with high resistance to oils and solvents is now available. It develops strong elastic bonds to leather, natural and synthetic fabrics, cork, wood, nylon, phenolics, and other plastics.

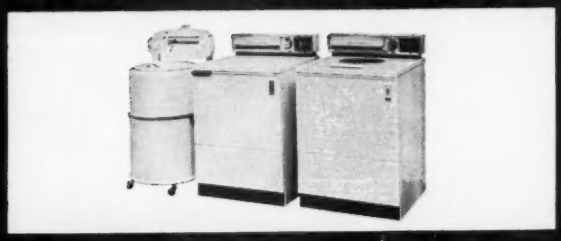
The material cures at room temperature. It's based on a urethane rubber, is colorless and has no residual odor.

When cured, the bonds are tough and flexible with good resistance to heat and cold.

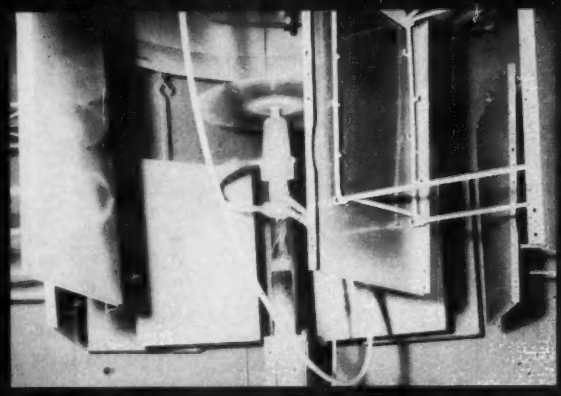
The mixed working life of the material is 18 hours. It can be applied by brush, spatula, roller coater, or similar methods. Under normal room temperatures, parts can be assembled 25 to 60 minutes after adhesive application. Time can be reduced to 5 minutes if heat is used to speed surface drying.

For further information, *write* B. B. Chemical Co., a subsidiary of United Shoe Machinery Corp., 784 Memorial Dr., Cambridge, Mass.

KELVINATOR
Washers and Dryers



Get their High Quality Finish with



RANSBURG NO. 2 PROCESS

Kelvinator Division of American Motors switched from hand spray to RANSBURG NO. 2 PROCESS Electro-Spray to meet increased production schedules . . . improve the quality of the finish . . . and lower finishing costs.

SAVINGS EXCEEDED EXPECTATIONS

Demonstration tests in the Ransburg labs indicated substantial savings in finishing costs, but in actual production, SAVINGS ARE EVEN GREATER than estimated. That's why Kelvinator is now considering RANSBURG Electrostatic Spray Painting for other products of their "white goods" line: Refrigerators . . . Home Freezers . . . Ice Cream Cabinets . . . Electric Ranges, as well as some components.

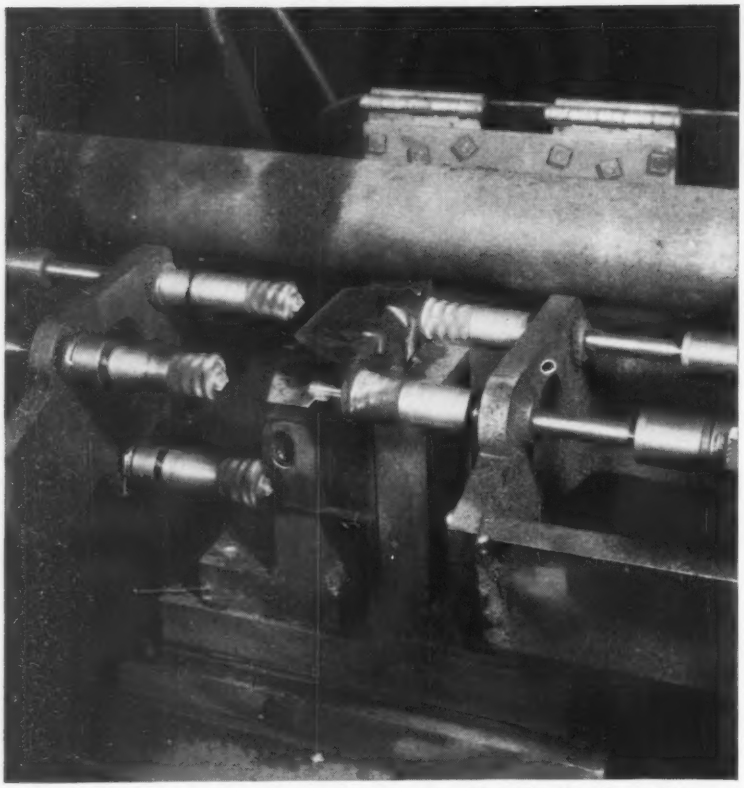
NO REASON WHY YOU CAN'T DO IT, TOO!

Want to know how Ransburg No. 2 Process can improve the quality of YOUR painted products, and at the same time, cut YOUR paint and labor costs? Write for our No. 2 Process brochure. Or, if your production doesn't justify automatic painting, let us tell you about the new No. 2 Process Electrostatic Hand Gun which can be used in either conveyorized, or non-conveyorized painting.

RANSBURG

RANSBURG
Electro-Coating Corp.
Box-23122, Indianapolis 23, Indiana

FACING... *another problem*



SPOT FACING operation at Monarch Rubber Company, Hartville, Ohio. These Osborn End Brushes—in combination with drills—are horizontally mounted in two drill clusters. They clean surplus rubber from bolt holes and face the area around bolt holes on both sides of this rubber-bonded-to-steel motor mount. Rate: 750 pieces per hour.

SOLVED *with Osborn power brushing*

Facing off surplus rubber inside and around the bolt holes of this shock-absorbing, rubber-bonded-to-steel motor mount used to be a production bottleneck for this manufacturer.

Now an efficient combination setup of drills and Osborn Power Brushes replaces a former slow, costly drill press operation. Production is up to 6,000 pieces per 8-hour shift with brush life running 18,000 to 20,000 parts.

Your own troublesome metal finishing problems of every description—deburring, cleaning, polishing, precision blending—can be eliminated with advanced Osborn power brushing methods. An **O**sborn **B**rushing **A**nalysis—made in your plant now at no cost or obligation—is the first step toward smoother, less costly production. Write for details. *The Osborn Manufacturing Company, Dept. S-21, Cleveland 14, Ohio.*

Osborn Brushes

OSBORN

Metal Finishing Machines . . . and Finishing Methods
Power, Paint and Maintenance Brushes
Foundry Production Machinery

NEW literature

Write directly to the company for a copy

Stainless Wire Manual

Data about chemical analyses and mechanical properties of stainless steel wire grades are included in a 22 page booklet. Stainless steel grades are discussed for almost 400 corrosive environments. Stainless & Strip Div., Jones & Laughlin Steel Corp., Box 4606, Detroit 34, Mich.

Small Tubing Guide

Bulletin 42, 12 pages, summarizes properties of 84 tubing analyses in seven groups: Carbon steels, stainless steels, alloy steels, nickel and nickel alloys, copper based alloys, glass sealing alloys, and reactive metals. The AISI part number, available form, characteristics, and applications are shown for each alloy. Specialty tubing products are also described. A special section contains information on standard tubing size tolerances, length, straightness, tolerances, and tempers. Superior Tube Co., 1585 Germantown Ave., Norristown, Pa.

Laminated Plastics

An 8-page article reprinted from *Machine Design* is a guide to specifications and methods for laminated plastics and vulcanized fibers. It describes the most common faults encountered and summarizes basic properties of this material group. Included is a chart which spotlights outstanding properties of various NEMA grade laminated plastics and vulcanized fibers. Taylor Fibre Co., Norristown, Pa.

Plating Solution

Analytical principles, the use of apparatus, and methods for sampling plating solutions are discussed in a 36 page booklet. Also included: A detailed step-by-step procedure for testing nickel, copper silver, and other metals finishing solutions; a description of equipment, component chemicals and solutions, atomic weights, and concentrations, and electrochemical data; and conversion tables. Hanson-Van Winkle - Munning Co., Church Street, Matawan, N. J.

Wire Rope and Slings

Abuses that shorten the life of wire rope and slings are pointed out in a 28 page booklet. Correct methods are emphasized with lively cartoons. Union Wire Rope Corp., 2160 Manchester Ave., Kansas City 26, Mo.

Lubrication Program

A booklet shows the cost saving importance of a comprehensive lubrication program. Included is the example of a manufacturer who saved 43,907 machine production hours, cut downtime more than 36 per cent, reducing costs $50,280. Mobil Oil Co., a division of Socony Mobil Oil Co. Inc., Room 2057, 150 E. 42nd St., New York 17, N. Y.

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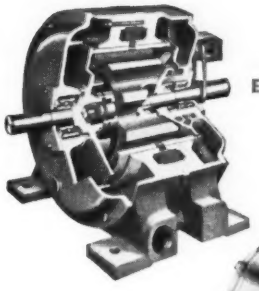
Your problem may be in the field of speed control, tension control, power transmission, or testing. Dynamatic Eddy-Current Equipment—couplings, brakes, drives, dynamometers — is solving these problems in virtually every industry, in both plant equipment and end products. It can do the same for you.

Dynamatic units offer the important advantages of rapid response, wide speed range, quiet operation, low power loss, low maintenance costs, and stepless adjustable speeds from an AC power source.

And Eaton Dyna-torQ magnetic-friction industrial clutches and brakes are solving driving and braking problems in all industries where accurate start-and-stop control is required. Check with the Eaton Dynamatic representative or distributor in your locality, or—



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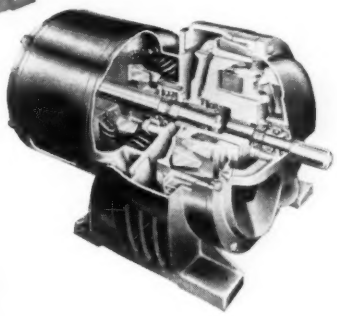

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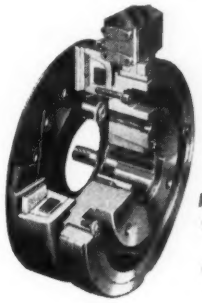

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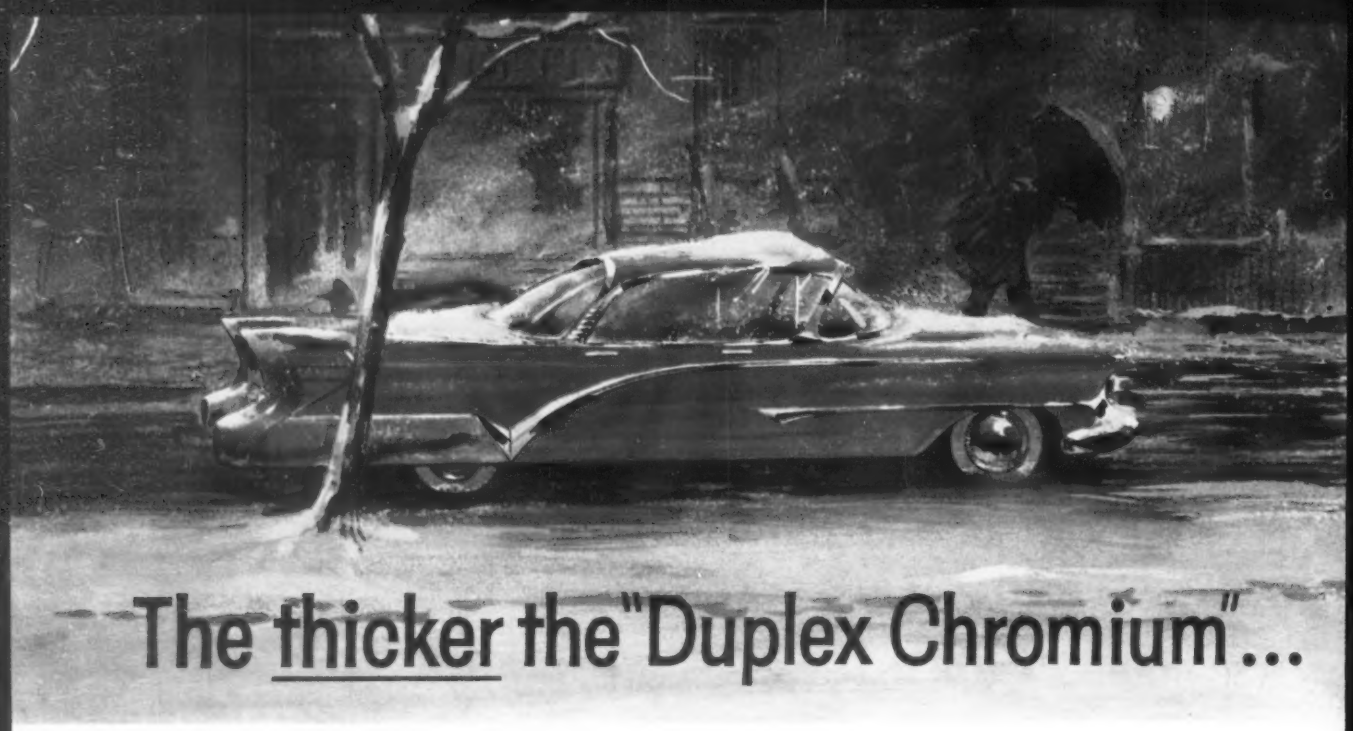

The thicker the "Duplex Chromium"...

Corrodkote[1] and CASS[2] tests of M&T "Duplex Chromium" show that increased plate thickness enables bright trim to stay bright.

At last the automotive industry has the means to maintain the gleaming appearance of brightwork through years of exposure to moisture, slush, salt air and industrial atmospheres. Thicker chromium does it. M&T "Duplex Chromium," plated long enough to deposit sufficient thickness, can make all the difference . . . give the ultimate in results.

By every modern test, M&T "Duplex Chromium" has clearly demonstrated its superiority. CASS tests on steel and zinc die cast panels show that corrosion resistance is multiplied many times over. Corrodkote tests also confirm a 5 to 10 times increase in durability. Initial results of 2-year outdoor exposure of thicker chromium to Detroit atmospheres suggest the same pattern of protection.

You'll do more to prolong life of the bright finish by plating thicker "Duplex Chromium" than with any other change in plating specifications. A minimum chromium thickness of 50 millionths of an inch works a dramatic improvement. 100 millionths works wonders.

For plating thicker chromium, Unichrome SRHS® Chromium baths offer substantial operating advantages . . . such as higher speed, self regulation, and better coverage in recesses. More important, they offer the only way to get the right type of deposit. M&T "Duplex Chromium" combines two deposits from these baths. One layer is crack-free to block entry of corrosives to underlying metal; and to give better distribution of the plate so that recesses, too, get ample thickness with no grayness or burning at edges. The other layer has an extremely fine crack-pattern to avoid localized corrosion experienced at tiny surface defects in zinc die castings.

Existing production equipment of sufficient capacity can be used with minor modifications. Send for technical data; or for an M&T plating engineer to survey your plant requirements.

(1) Corrodkote test: a standard, uniform, highly corrosive slurry is applied on test piece, which is then placed in non-condensing humidity cabinet. Each cycle is 16 hours.

(2) CASS test: copper-accelerated acetic acid salt spray.

M&T **plating products** · welding products
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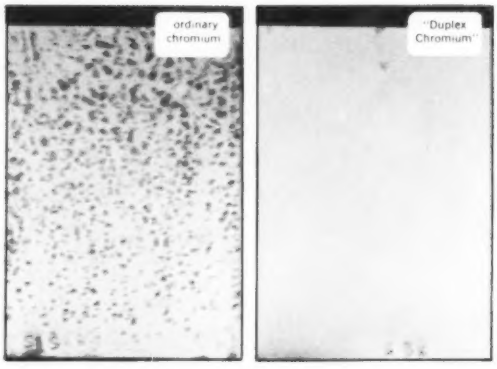
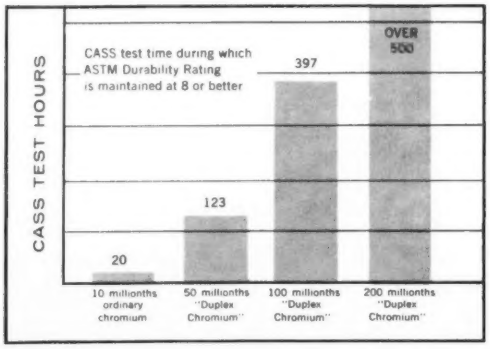
METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey

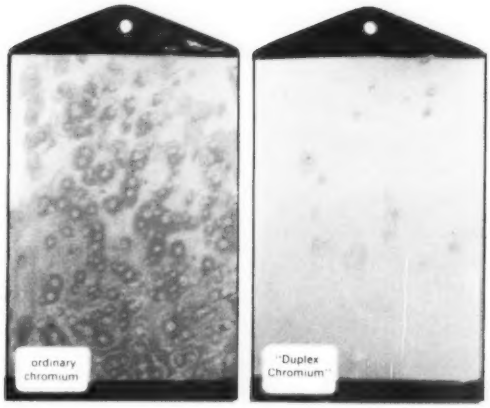
the longer the plating lasts!



The chromium plated steel panels above underwent 135 hours of CASS testing. Both had identical undercoats of 0.3 mil of copper and 1.0 mil of nickel. Yet one rusted, the other did not. Why? Because the left panel had only 10 millionths of an inch ordinary chromium plate . . . while right panel had 50 millionths M&T "Duplex Chromium."

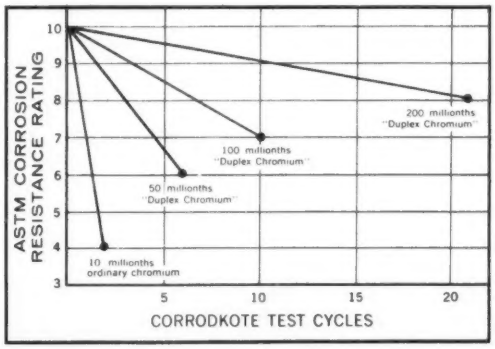
Graph below indicates how corrosion resistance increases with chromium plate thickness. The thicker the chromium, the more CASS test hours it can take.





Same thing happens with zinc die cast panels in 4 cycles of Corrodkote testing. One corrodes badly compared to the other. Why? Same reason. Both panels had identical undercoats, but left one had only 10 millionths of an inch ordinary chromium, while the right one had 50 millionths of M&T "Duplex Chromium."

Graph below shows that in Corrodkote testing, too, the thicker the chromium, the longer will it keep its appearance near the perfect mark of 10 on the ASTM durability scale.



here's a plant that's growing like a weed

Last September, SEAWAY STEEL CORPORATION opened its doors! To date, Seaway craftsmen have produced thousands of tons of quality steel bars and rods — serving firms in the forging and fastener fields and other types of industry requiring quality steel rolled to rigid specifications.

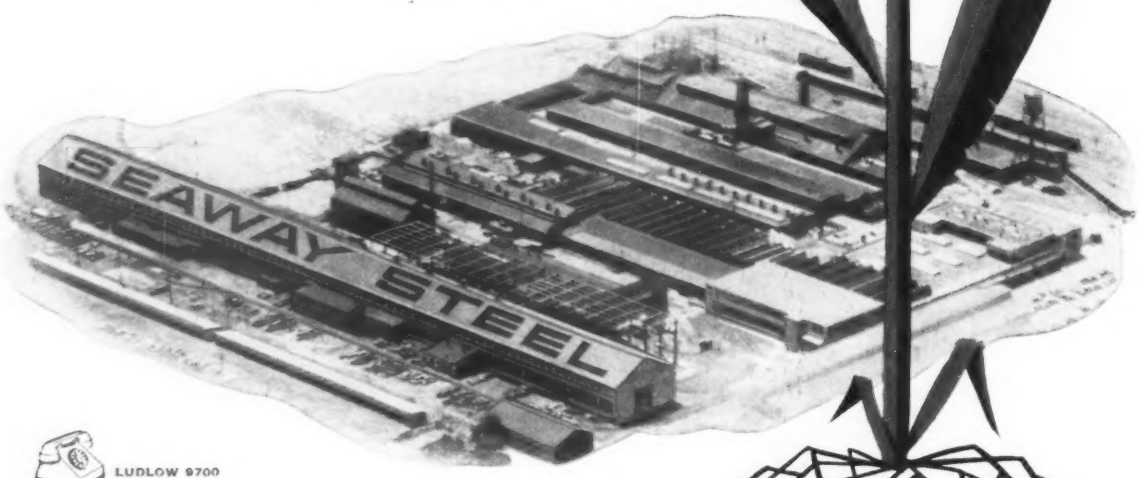
The Seaway operation is geared to give every order, large or small, the *same* special attention.

Bars and Rods of any size or shape produced to your specifications, regardless of quantity.

SPECIAL ANALYSIS • SPECIAL SURFACE FINISHES
SPECIAL HARDNESS • SPECIAL HEAT TREATING

Though our *name* is new, the steel craftsmen at Seaway have worked together for decades producing high quality steel for cold heading and nut formations.

SERVICE? *Ask us about a delivery date on your next order!*



LUDLOW 9700

SEAWAY STEEL CORPORATION
101 EAST AVENUE • NORTH TONAWANDA, NEW YORK

Odds Still Favor Record Output

LOOK FOR STEELMAKERS to produce 62 million ingot tons in the first half and 56 million in the second. Business may not be booming, but it's good enough to warrant record production of 118 million tons this year. In 1955, the biggest year to date, industry output was 117 million tons.

FORECASTS REVISED— At annual meetings, industry leaders attributed the current weakness in steel demand to consumer inventory policies. Since the first of the year, users have boosted their stocks from 13.5 million tons to 18 million —and that's apparently as high as they're going. Most observers had counted on a buildup to 22 million or even 24 million tons. Avery C. Adams, chairman of Jones & Laughlin Steel Corp., called buyers' restraint "commendable" but pared his estimate of 1960 ingot production from 130 million tons to 120 million. Arthur B. Homer, president of Bethlehem Steel Corp., did likewise.

CONFIDENCE PREVAILS— Although he saw "nothing in the picture to indicate that we have passed the low point," George M. Humphrey, chairman of National Steel Corp., declared that 1960 "will still be a good year as a whole." Joseph L. Block, chairman of Inland Steel Co., said: "High personal income and increasing capital expenditure augur well" for the industry. Roger M. Blough, chairman of U. S. Steel Corp., declared that 1960 will be "an average year—one of the best average years we've had."

AHEAD OF LAST YEAR— Even though the ingot rate has tumbled almost 20 points in the last ten weeks, steel production is well ahead of last year's record first half pace. Output through April: 44.6 million ingot tons (vs. 41.8 million in the corresponding period last year).

BUT SLIDE CONTINUES— Last week, steelmaking operations skidded 2.8 points to 74.8 per cent of capacity. Production was about 2,132,000 ingot tons. If operations held at the current level through June, first half output would be nearly as high as last year's (63 million vs. 64.3 million), but the decline is sure to continue.

Look for operations to average about 73.5 per cent of capacity this month and 69 per cent of capacity in June. The ingot rate could go even lower, but the odds are against it. Reason: May shipments will be about 6.8 million tons—equal to or slightly less than consumption. Dropping to an average of 69 per cent in June would widen the gap between shipments and consumption to nearly 1 million tons, with the difference coming out of inventory. Stocks aren't big enough to permit liquidation at that rate for too long, to say nothing of accommodating the faster runoff that would result if the ingot rate dropped lower.

Assuming that first half ingot production is 62 million tons, operations need average only 75 per cent of capacity in the second half to set a record for the year.

AUTO SALES GAINING— During the Apr. 11-20 selling period, retail deliveries of new cars were at the highest midmonth rate since 1955. Industry observers believe these figures point to a 15 per cent gain in sales for the year as a whole. If so, the 1960 total for U. S. built cars will be about 6.3 million. (In addition, about 500,000 foreign autos will be sold in the U. S.) May production is expected to be about 613,000 units (vs. 585,000 in April). In Detroit, producers of specialty steel in the high carbon ranges are getting their first orders for third quarter delivery. Initial shipments will be for 1961 model tryouts. No big orders are expected for another month.

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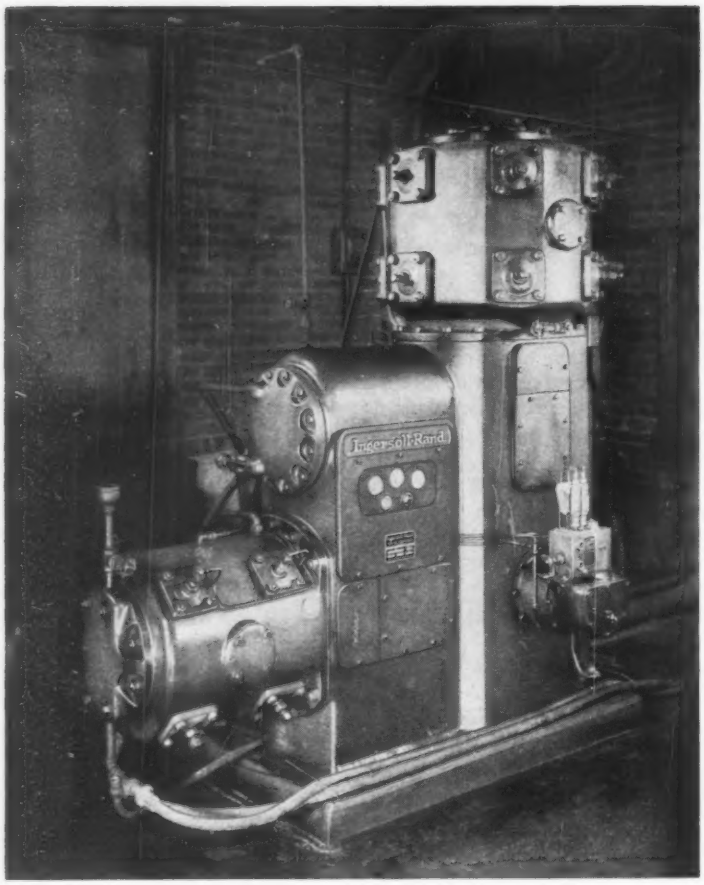
*Current prices were published in the May 2 issue and will appear in subsequent issues.



IN I-R COMPRESSORS,

TIME TELLS

THE DIFFERENCE

This XLE compressor has operated 24 hours a day for more than

63,648 HOURS

with no forced maintenance since installed in 1951

At the Conshohocken (Pa.) plant of the Lee Rubber & Tire Corporation, this Ingersoll-Rand XLE air compressor has operated at full load, 24 hours a day, six days a week, with no forced shutdowns since installed in 1951. At this writing, the unit has totalled 63,648 hours and is still going strong!

The only maintenance has been to check the valves once every three months on Sunday. This XLE operates as the plant's base-load air compressor, with the load variations being handled by another unit.

The XLE compressor had been purchased largely because of good performance of other I-R equipment in the same plant, including three different types of compressors and a variety of pumps.

The *extra value* that's built into every Ingersoll-Rand compressor pays off with *long-run economy*. Reduced maintenance and attention, over many years, mean long-range savings in the cost of air power. Ask your I-R representative to show you how to get your maximum *"Dividend on Payroll Dollars"* with a Planned Annual Review of your air power system.

*ONLY IR COMPRESSORS HAVE CHANNEL VALVES

Known for high efficiency, quiet operation and exceptional durability. Entirely different. Each valve is a combination of rigid stainless-steel channels and bowed leaf springs, with trapped-air spaces which cushion action, prevent impact.

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THE WORLD'S MOST COMPREHENSIVE COMPRESSOR EXPERIENCE

Rare Earth Markets Grow

A host of new uses, many in steelmaking and other metallurgical operations, hold promise of pulling them out of the "rare" category. The metals are as abundant in nature as copper, lead, or zinc, but high prices and lack of large poundage markets have kept usage around 3000 tons annually

THE exotic, sparingly used rare earths may be on the verge of becoming materials of everyday industrial application. A host of new and potential uses, paced by steelmaking, could provide them with the large poundage markets that have eluded them so far.

Producers, stung in the past by overoptimism, are being cautious with their forecasts.

• **What They Are**—The rare earth category embraces 15 tongue twisting metals whose atomic numbers run from 57 to 71. As a group, they're similar; individually, they have somewhat different properties. Yttrium, which is found in conjunction with the rare earth ores, and scandium, which is extracted mainly from uranium concentrates, are not technically rare earths, but they are generally lumped into this category because of their similar chemical and physical properties. Promethium is a product of fission and available only from the Atomic Energy Commission laboratory at Oak Ridge, Tenn.

Rare earths of doubtful purity have been available in the U. S. since World War I. Quality has been improved via new extraction processes in the last five years. High purity rare earths (with the exception of cerium and lanthanum) are available.

Uses have about doubled in the five year period. The U. S. Bureau of Mines estimates that around 3.2 million lb of rare earth oxides were consumed in this country in 1958 and about 2.8 million lb last year. Industry sources believe 1960 sales should hit about 4 million lb and have a dollar value approaching $6 million.

• **Big Potential Market**—The steel industry offers one of the best prospects for early growth in terms of poundage and dollars. About 95 per cent of rare earth usage in steelmaking is in the production of rimmed steel—the application also has the biggest immediate potential. Five years ago use of the double salts of the rare earths to reduce the size and number of nonmetallic inclusions in rimming steels probably didn't total more than 100,000 lb annually. Today, the figure is close to 1 million lb. Within five years, consumption in rimming steels may increase tenfold, believes Dr. Norman F. Tisdale, manager of sales, Molybdenum Corp. of America, Pittsburgh.

Here's why: Steelmakers are anxious to switch from conventional molds (which usually weigh less than 30,000 lb) to types running 50,000 to 75,000 lb. Reason: Substantial labor savings are possible. To produce such large ingots, the size of nonmetallics must be reduced to assure uniform grain structure. That's where the rare earths come in.

The rub is that special equipment is needed and only four steel companies can handle molds weighing 50,000 lb; only one has molds exceeding 70,000 lb. One steel company is into regular production with big molds, and three are experimenting with them. Currently, big mold capacity for rimmed steel is around 9 million tons and may rise to 12 million-15 million tons by 1965.

Another use by steelmakers is inclusion of the rare earths in blast furnaces to increase the rate of reduction of iron ore to iron. "Laboratory tests indicate a 7 to 12 per cent increase is possible," says Dr. Tisdale.

A third steelmaking application is the addition of rare earths to reduce the sulfur content of blast furnace hot metal. Just enough limestone is added in the furnace mix to reduce sulfur content to 0.35 per cent. This means more iron ore and coke can be added, increasing furnace yield 5 to 7 per cent. After the metal leaves the furnace, rare earths are added in the trough to reduce the sulfur content to the acceptable 0.30 per cent or under, says Dr. Tisdale.

• **Foundries Hopeful**—Rare earths are being used to improve the ductility of castings. One producer tells of a foundry that reduced its use of risering by 20 per cent through addition of the rare earths, and it also got a greater yield from less

Roster of Rare Earths

NAME	ATOMIC NUMBER
*Scandium	*21
*Yttrium	*39
Lanthanum	57
Cerium	58
Praseodymium	59
Neodymium	60
Promethium (Illinium)	61
Samarium	62
Europium	63
Gadolinium	64
Terbium	65
Dysprosium	66
Holmium	67
Erbium	68
Thulium	69
Ytterbium	70
Lutecium	71

*Technically not rare earths but generally considered in this category because of close chemical and physical similarities.

metal. The same producer sees a good potential in additions to low carbon steels to improve ductility and impact resistance.

For the last four years, rare earths have been used to improve the hot workability of low carbon and stainless ingots. They're also being employed in the production of nodular iron to dissipate the occurrence of tramp elements and in low alloy steels used in airplane landing gears (to enhance low temperature, transverse, impact qualities).

• **Other Metallurgical Uses**—Certain aluminum and magnesium alloys contain rare earths, and there's promise of a much bigger market here. For instance, rare earths are being used to reduce the size of inclusions in aluminum engine blocks. If a universal switch to aluminum engines ever comes, Dr. Tisdale sees a market for 750,000 lb yearly in autos alone.

• **Present, Future Markets**—One of the biggest present uses is in the cores of carbons for arc lighting. The market is relatively static and could diminish.

Glass polishing, already a major market, could be greatly expanded, believes Richard L. Stone, sales manager-rare earths, Davison Chemical Div. of W. R. Grace & Co. (The glass making process could consume 10 million lb of concentrates a year in the near future, believes Dr. Tisdale.)

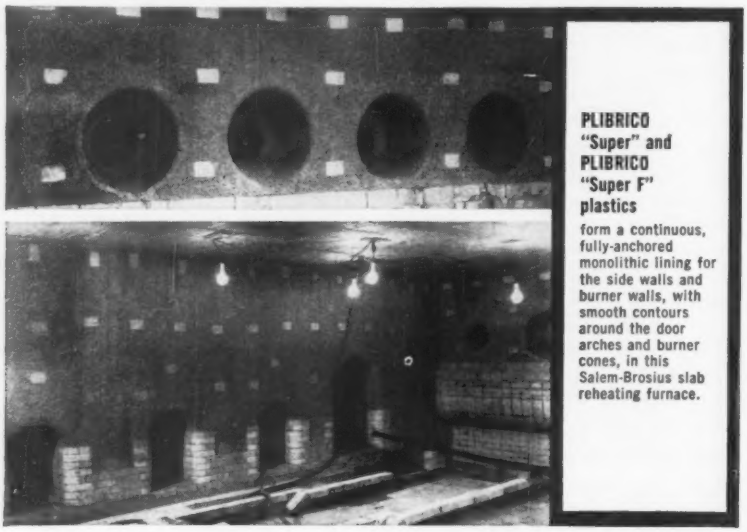
Rare earths have a number of unusual properties for thermal electric conversion and good magnetic and electrical properties which may eventually open up important markets, believes Mr. Stone. Yttrium has promise as a structural metal in atomic reactors and missiles, says the U. S. Bureau of Mines. Samarium, gadolinium, europium, and dysprosium could find a market as materials for nuclear control rods. Uses should grow in ceramics, electronics, and chemicals.

• **Anything but Rare**—There's nothing rare about the rare earths. Even if the most optimistic forecasts are realized, no shortage or tightness in supply will result. They are about as abundant in nature as copper, lead, and zinc, and we have the world's largest deposits in the U. S. Present U. S. production and separation facilities could turn out about 40 million lb of material (oxides) a year if demand were there.

• **Prices Lower, Still High**—Though the price trend has been down, the rare earths are still high in cost. Quotations range from $3.50 a pound for misch metals (a mixture of many rare earths, the form most commonly used) up to a top of $5000 a pound for some of the metals. Rare earths are generally used as oxides, fluorides, chlorides, and carbonates. Their prices vary from 30 cents to $1 a pound.

Prices go up sharply as the rare earths are separated into separate metals. The most expensive are in the heavy group (those with atomic numbers from 64 through 71) because they're less abundant and more difficult to separate. The price trend should continue downward.

• If you'd like to have a copy of this article, write to Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio. You may win $1000 by using material like this in STEEL. For details, see the Servicenter, Pages 5 and 6.



PLIBRICO "Super" and PLIBRICO "Super F" plastics form a continuous, fully-anchored monolithic lining for the side walls and burner walls, with smooth contours around the door arches and burner cones, in this Salem-Brosius slab reheating furnace.

Plibrico plastic refractories selected at Inland Steel Co. for 130 tons/hr slab reheating furnace

Properties of Plibrico "Super" and Plibrico "Super F" plastic refractories are geared to the demands of this 99′ triple-fired slab reheating furnace placed in service in 1958 at Inland's 76″ mill. Capable of withstanding severe conditions, Plibrico "Super" lines the preheat zone, while Plibrico "Super F" lines the high heat and soaking zones.

Less maintenance—longer service life assured . . . formulated specifically for tough assignments, Plibrico "Super F" is highly resistant to stresses, vibration, mechanical and thermal shock. It is exceptionally stable, and with its low porosity resists destructive penetration of otherwise harmful combustion by-products.

For furnace linings that cost less and last longer, call your local Plibrico distributor-engineer . . . WRITE FOR CATALOG 69 covering steel mill, industrial and foundry applications

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Texas Market Overrun With Foreign Steel

The Texas market continues to be overrun with foreign steel. While tonnage figures are not yet available for April, the total may be almost as high as that in March when 83,000 tons were imported. Much of the March-April tonnage was ordered before settlement of last year's steel strike.

Since January, orders for foreign steel have declined sharply. One foreign mill agent said a slight upswing in new orders was noted during the last week of April. Current ordering, he said, is mostly for reinforcing bars.

The agent said no new foreign mill price reductions are expected. The West European mills are heavily booked up, and they are making every effort to fill strong demand at home while sales to countries other than the U. S. are mounting.

It's thought certain the Texas Highway Department will again be asked to ban the use of foreign steel in road building projects. A 1958 regulation was never implemented because of opposition from the U. S. Bureau of Public Roads. Now, it appears, that federal bureau has taken a more neutral stand, at least unofficially, and there are indications it will not stand in the way of the separate states deciding whether or not foreign steel can be used in partially federally financed projects.

Meanwhile, spokesmen for Southwest District steel mills are pessimistic about May and June operations. Demand for plates is strong, but orders for wire products, merchant items, and reinforcing bars are poor. The pace-setting Houston mill is operating at 75 per cent of capacity, and its merchant mill is closed. The plant's wire mill resumed operations May 2 after being down most of April.

Wire . . .

Wire Prices, Pages 191 & 192

Wire products are in ample supply to meet current demand. This applies to both merchant and manufacturing grades. Some wire mills producing specialties are cutting their operating schedules as much as 10 to 15 per cent to a level of 60 to 70 per cent of capacity.

Until recently, specialty volume compared favorably with other wire grades. Now rod buying is reflecting slackened demand, some converters holding substantial inventories.

The U. S. Engineer, Chicago, closes May 20 on 1985 coils, 0.041 in. in diameter and 525 coils, 0.1350 in. diameter, carbon steel.

Tin Plate . . .

Tin Plate Prices, Page 191

Demand for tin plate continues strong, and the mills expect to run at capacity through July. The can-making industry will be busy over the next several months producing cans for the 1960 food pack. It's expected that heavy shipments of plate will extend into September.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 190

Sharp competition is reported in the reinforcing steel bar market. Orders are more numerous, but they generally involve small tonnage.

Most bar fabricators still hold substantial stocks.

Officials of Pacific Coast Div., Bethlehem Steel Co. stated that the recent revision in quantity extras on various steel products in the Pacific Northwest did not apply to reinforcing bars.

Steel Bars . . .

Bar Prices, Page 189

Most sizes of hot rolled carbon bars are available for delivery in two to four weeks. Cold finished bars can be had as quickly, converters now being adequately supplied with hot bar stock.

Demand for all classifications of bars (hot rolled, cold drawn, and alloy) continues slow. It's reported that a Buffalo area mill has placed some of its bar mill employees on a four-day week, some of the affected workmen using the time off for their annual vacations.

Although it shipped at capacity rate in April, and forecasts a 90 to 92 per cent shipping rate this month, a medium size producer of hot rolled bars in the Pittsburgh District, says all is not well. Reason: Almost all of the tonnage that will be shipped this month has been produced, and business remaining on the books isn't sufficient to sustain ingot production at more than 65 per cent of capacity. As a result, the company must quote extended deliveries in competition with firms that are promising delivery within two or three weeks.

Since users have rebuilt their inventories, they're buying only for consumption and in many industries current requirements are light. Barmakers are disappointed with their sales to railroad carbuilders and bearing manufacturers. The major producers of earth moving equipment and tractors are buying at a fairly good rate, but their smaller competitors are out of the market. Chances for an upturn in July or August aren't good because of the many plant-wide vacations scheduled for those months.

While service center inventories of most products are high, some distributors are short of heat treated and annealed material. Distributor demand for alloy bars is holding up surprisingly well.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 190 & 191

No longer concerned about supplies—not even of cold rolled and galvanized grades—sheet consumers are specifying for immediate needs; in some cases, they are drawing on stocks for current manufacturing needs, thus reducing their inventories.

Most mills are quoting June shipment, and report little buying interest beyond that month. Some mills report galvanized sheets are in fairly strong demand, and are likely to continue so for the next couple of months. However, supplies are noticeably easier than they were earlier in the year.

The outlook for demand over the rest of this quarter is not too promising. Automakers are ordering little additional tonnage and are not expected to re-enter the market with substantial orders until July when they will start placing tonnages for their 1961 model programs.

Generally, it's estimated buying is off 50 to 75 per cent from what it was a couple of months ago. Most users are watching their inventories closely, buying new steel only to support operations.

Sheet mill operations are tapering, but should be at a fairly high level the rest of this quarter. In galvanized, mill schedules should be quite high, as those mills are well booked, with only spot openings available.

Inquiry for enameling stock and electrical sheets is easier, in line with the situation in most other grades of flat rolled steel.

Distributors . . .

Prices, Page 194

Steel service centers report April business was the lightest for any month so far this year. One leading distributor in the Philadelphia District says business was off 25 per cent from the volume recorded in March. The major decline was in sheets, he adds.

Most officials in the industry doubt that May will bring any substantial improvement. One of the main reasons for the drop in bookings from the rate established earlier in the year is the fact that users have replenished stocks to desired levels. They are assured prompt delivery on practically all products to fill spot requirements.

While volume has been climbing slowly in the Southwest, the genuine upsurge which had been predicted with the coming of favorable weather has not materialized. The marketing situation in that area is highly competitive with significant tonnages of relatively cheap imported steel overhanging the market.

Executives of steel service centers in the Northwest also are disappointed at the current business rate. Some are inclined to blame the tapering in business in the last two or three weeks to recent reduction in quantity extras. The belief is based on the theory that buyers are hesitant to place orders until the price situation is stabilized.

Tubular Goods . . .

Tubular Goods Prices, Page 193

Because it has a big order backlog, a leading Pittsburgh area producer of tubular specialties managed to ship as much tonnage in April as it did in March. From a booking standpoint, April was a slightly better month than March, the company reports.

The recent improvement in automobile sales hasn't given rise to greater demand for mechanical tubing. Consumers rebuilt their strike depleted inventories at a surprisingly rapid rate, and now have more steel than they want.

Sales of mechanical tubing to machinery and industrial equipment makers are poor. Auto builders aren't expected to place any big orders until they're ready for volume production of 1961 model cars, but at least one tubemaker thinks a moderate upturn in automotive demand will come along during June and July.

Stocks of pressure tubing are more than adequate at both the distributor and consumer levels, but probably not as large as those held by the mechanical tubing users. Sales are expected to climb slowly but steadily as utilities and boiler manufacturers resume buying for current consumption.

Demand for tubing by antifriction bearing producers is off in New England; heavy shipments of bearings during the first quarter reduced order backlogs and most makers will

go through midyear with stocks on hand. Mild improvement in steel pipe requirements for construction projects is partially balanced by a decline in shipyard buying. Most merchant pipe is sold through distributors in the Northeast, and their inventories are well balanced.

Oil well drilling operations declined again during the week ended Apr. 25, ending a three week upturn. Hughes Tool Co. reported 1796 rotary rigs operating, off 33 from the week before. A year ago 2108 rigs were engaged.

Stainless Steel . . .

Stainless Steel Prices, Page 193

Production of stainless and heat resisting steel ingots in the first quarter this year totaled 386,786 net tons, reports the American Iron & Steel Institute. In the first quarter last year, output was 346,167 tons.

Plates . . .

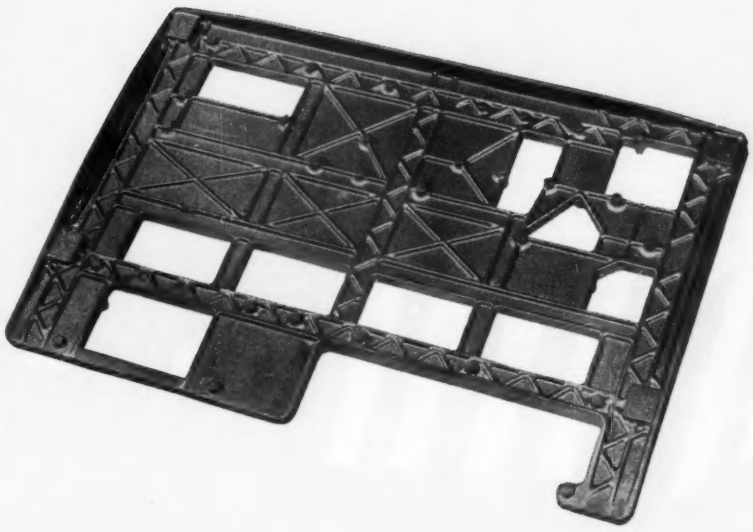
Plate Prices, Page 189

Order cancellations and deferments have dropped off to normal proportions, but there's still no hint of a pickup in demand for plates. Current market support is coming mainly from some Midwestern pipeline projects. Steelmakers think their customers have big enough inventories to operate comfortably until fall. In the next few months, they'll buy only what they need to complete work in process or to balance stocks.

Plate production will be lower this month than it was in April. Sales executives at Pittsburgh are expected to keep their order books open until the middle of the month, but the chances are they won't be able to sell more than 70 per cent of their capacity.

Demand for wide plates is disappointing. Demand for plates from 96 in. mills is relatively good because they are needed by pipe producers who have large orders from gas transmission companies.

Deliveries on sheared plates are easier, if anything, running two to four weeks. Universal plates can be had quickly, except at some mills which have had to unduly delay rollings pending accumulation of orders to support rolling schedules. Deliveries range six to eight weeks on alloy and clad plates, with spe-



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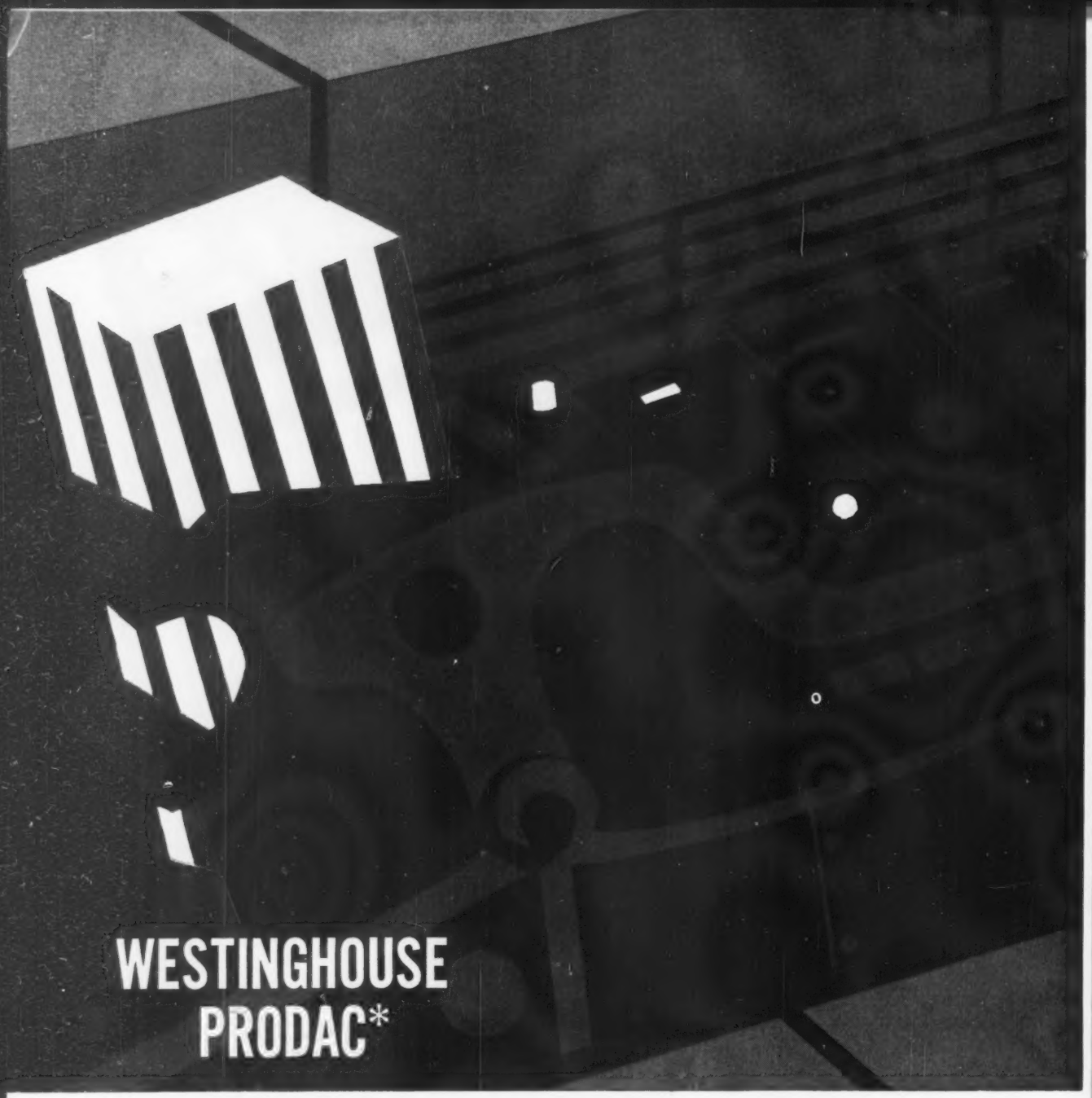

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cialties moving relatively better than carbon plates. However, there's little special activity in any line.

Tank and boiler work is slow. The same is the case with shipwork, pipeline construction, railroad requirements, and structural needs. Oil and chemical industry demands continue to lag, but not quite as severely as some other lines of consumption.

Plate fabricating shops in New England have slim backlogs and are estimating relatively small tonnages. New orders are light and the shops are not building steel inventories above current levels. Some fill-in buying of high tensile and alloy plates is reported on a prompt shipment basis. Few shops have adequate stocks of those grades.

Shipments of plates in the first quarter were slightly in excess of the tonnage movement in structurals in most areas, but New England was an exception. Tonnage there was adversely affected by the shipyard strike, and accumulated stocks of finished tanks.

Semifinished Steel . . .

Semifinished Prices, Page 189

Steelmaking operations fell sharply last week, the national ingot rate dropping to 74.8 per cent from 77.6 the preceding week. The rate is now at the lowest point since operations were resumed following the strike last November, and it's still pointed downward.

Declines were reported last week in the Northeastern District, Buffalo, Youngstown, Detroit, Chicago, and in the South. Increases were reported at Cleveland, Cincinnati, and St. Louis, while rates held at Pittsburgh and in the West.

Blast furnace operations are being cut back at some points along with open hearth furnace curtailments. Last week, Republic Steel Corp. blew out No. 2 stack at its Youngstown plant and banked a blast furnace at its Cleveland Works.

In the Chicago District, Inland Steel Co. is continuing to operate close to capacity. Part of its current production is to improve its semifinished steel inventory which has been low since the end of the steel strike. The inventory build-up may account for 2 or 3 points in the company's May steelmaking rate.

Acme Steel Co.'s new oxygen converter facility is now producing at over 70 per cent of capacity, with full operations expected to be attained by midsummer. Until early April, production was held down pending installation of a second ladle crane.

Buffalo District mills are putting some of their current open hearth output into ingot inventory. They plan on having semifinished steel ready for rolling as soon as orders for finished products are received, thus assuring customers prompt deliveries. As soon as the semifinished inventory is considered adequate, ingot production is expected to decline.

Structural Shapes . . .

Structural Shape Prices, Page 189

Structural fabricators are having difficulty in maintaining order backlogs. Some of them are losing ground despite the season, and price competition is keener than it was a few weeks ago.

Even though March bookings of fabricated structurals were the largest for that month since 1956, and exceeded the February, 1960, figures by 19 per cent, no pickup in demand for shapes has resulted. Fabricators have been able to start most of their jobs with steel from inventory.

Standard structural makers are almost begging for business—mainly because of a deficiency in railroad carbuilding. Some of the leading mills won't book more than 60 per cent of their capacity this month. Wide flange beam sales are holding up fairly well, thanks to highway construction and bridge building. Major producers will probably sell 70 to 75 per cent of their May capacity. Competition will be stiffer in June, when a Chicago area producer puts new facilities into operation.

The threat posed by foreign steelmakers remains serious. Case in point: About 3000 tons of beams and bars were recently dumped in New York at $90 a ton—$25 to $30 a ton below U. S. mill quotations. U. S. mills face increasingly stiff competition in the Canadian market from Japanese, German, and British producers. The Canadians will have a domestic source of wide

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flange beams when Algoma Steel Corp. Ltd. starts producing them at Sault Ste. Marie, Ont.

New England structural shops are operating on reduced schedules. Most of them have smaller backlogs, notably those without bridge commitments. Bridge tonnage being figured is heavier, and the larger integrated shops are booking more of that class of work. With plain material shipments available in less than a month, fabricating shops are not buying steel beyond immediate needs.

Proposed bridge projects in the Pacific Northwest involve important structural steel tonnages. Washington State plans a $6 million, four lane bridge across the Columbia River, bids to be taken about July 1. Officials plan to take a new look at the proposed multimillion dollar Columbia River span near Astoria, Oreg.

Isaacson Iron Works, Seattle, has booked nearly 2000 tons of structurals for two Seattle buildings. Bids are in at Anchorage, Alaska, for a government mental hospital involving 750 tons of shapes, and the 5-story Providence Hospital, at Anchorage, involving a large quantity of steel. This project will be bid May 10. It will cost $4.25 million.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2010 tons, interchange structures, Jones Falls Expressway, Baltimore, to Lehigh Structural Steel Co., Allentown, Pa.; C. J. Langenfelder & Sons, Baltimore, general contractor.

1200 tons, four-story addition to Securities Bldg., Seattle, to Isaacson Iron Works, Seattle; Brazier Construction Co., Seattle, general contractor.

527 tons, five state highway bridges, Waterbury-Cheshire, Conn., to American Bridge Div., U. S. Steel Corp., Pittsburgh; Brunalli Construction Co., Southington, Conn., general contractor.

500 tons, Coliseum Building, Seattle, exposition site, to Isaacson Iron Works, Seattle; Howard S. Wright Construction Co., Seattle, general contractor at $2,960,934.

375 tons, three-span continuous deck bridge, Weare, N. H., to American Bridge Div., U. S. Steel Corp., Pittsburgh; Perini Corp., Framingham, Mass., general contractor; 85 tons of concrete reinforcing bars to Bethlehem Steel Co., Bethlehem, Pa.

215 tons, physics building, Clemson College, Clemson, S. C., to Miller Equipment Co., Salisbury, N. C.; General Construction Co., Columbia, S. C., general contractor.

257 tons, state highway bridge, Alligator River, Tyrell-Dare counties, North Carolina, to Montague-Betts Co., Lynchburg, Va.; T. A. Loving & Co., Goldsboro, N. C., general contractor; 300 tons of miscellaneous steel, to Carolina Steel Co., Greensboro, N. C. (plates), and American Bridge Div., U. S. Steel Corp., Pittsburgh (floor deck); Earle Gear & Machine Co., Philadelphia, machinery.

200 tons, regional high school, Mattapoisett, Mass., to Groisser & Shlager Iron Works, Somerville, Mass.; Tornabene Bros. Co., Newton Upper Falls, Mass., general contractor; reinforcing bars to Joseph T. Ryerson & Son Inc., Boston.

STRUCTURAL STEEL PENDING

750 tons, Alaska Mental Hospital, Anchorage, Alaska; Lease Co. Inc., Seattle, is low bidder at $5,827,000.

70 tons, also reinforcing, Washington State undercrossing, King County; bids to Olympia, Wash., May 10.

Unstated, public safety building, Anchorage, Alaska; general contract to Warrack Construction Co., Seattle, at $1,423,010.

Unstated, five story Providence Hospital, Anchorage, Alaska, costing $4.25 million; bids to be taken May 10.

REINFORCING BARS . . .

REINFORCING BARS PLACED

2000 tons, underground garage, Boston Common, Boston, to Bethlehem Steel Co., Bethlehem, Pa.; Foundation Corp., New York, general contractor; 175 tons, sheet piling, to U. S. Steel Corp., Pittsburgh, and 325 tons, steel bearing piles, to Bethlehem Steel Co.

1625 tons, state highway bridge, Alligator River, Tyrell-Dare counties, North Carolina, to Virginia Steel Co., Charlotte, N. C.; T. A. Loving & Co., Goldsboro, N. C., general contractor.

1352 tons, interchange structures, Jones Falls Expressway, Baltimore, to Bethlehem Steel Co., Bethlehem, Pa.; C. J. Langenfelder & Sons, Baltimore, general contractor.

700 tons, Coliseum Building, exposition site, Seattle, to Joseph T. Ryerson & Son Inc., Seattle.

325 tons, five state highway bridges and pavement, Waterbury-Cheshire, Conn., to Scherer Steel Co., East Hartford, Conn.; Brunalli Construction Co., Southington, Conn., general contractor; also 400 tons, mat reinforcement, to Brickman-Joy Corp., Hartford, Conn.

320 tons, United Controls electronics plant, Seattle, to Northwest Steel Rolling Mills Inc., Seattle; Cawdrey & Verno, Seattle, general contractor.

260 tons, research laboratory, Scott Paper Co., Philadelphia, to American Steel Engineering Co., Philadelphia.

240 tons, laboratory and cafeteria, American Cyanamid Corp., Princeton, N. J., to United Steel Products, Trenton, N. J.; John McShain Inc., Trenton, general contractor.

192 tons, senior high school, Quarryville, Pa., to Brocker Steel Co., York, Pa.

110 tons, residence hall, University of Delaware, Newark, Del., to Bethlehem Steel Co., Bethlehem, Pa.

110 tons, high school, Spokane, Wash., and Washington State road bridge, Thurston County, to Pacific Coast Div., Bethlehem Steel Co., Seattle; Selkirk Construction Co., Spokane, general contractor.

REINFORCING BARS PENDING

350 tons, Washington State, two highway bridges, Pierce County; general contract to Allen R. Anderson, Seattle, low at $359,771.

185 tons, Puyallup River bridge, general contract to Puget Construction Co., Seattle, at $209,851, by Pierce County Commissioners.

80 tons, also miscellaneous, water reservoir, West Slope District, Portland, Oreg.; bids May 8.

55 tons, also miscellaneous, two bridges; general contract to Hansen & Parr, low at $84,476, to the county commissioners, Spokane, Wash.

Unstated, four story addition to Virginia Mason Hospital, Seattle; bids June 7.

Unstated, two, 5 story women's residence halls, Washington State College, Pullman, Wash.; bids to the board of regents May 25.

Unstated, Oregon State highway projects; Umatilla County, two, 425 ft spans; Jackson County, 206 ft Beach Creek bridge; bids to Salem, Oreg., May 10.

PLATES . . .

PLATES PLACED

1735 tons, high tensile, grade Hy-80, Navy, General Stores Supply Office, Philadelphia, to Lukens Steel Co., Coatesville, Pa.

PIPE . . .

CAST IRON PIPE PENDING

500 tons or more, 16,500 ft of 6 and 8 in. for Adak, Alaska, Navy Base; bids in May 4 to Navy Supply Depot, Seattle.

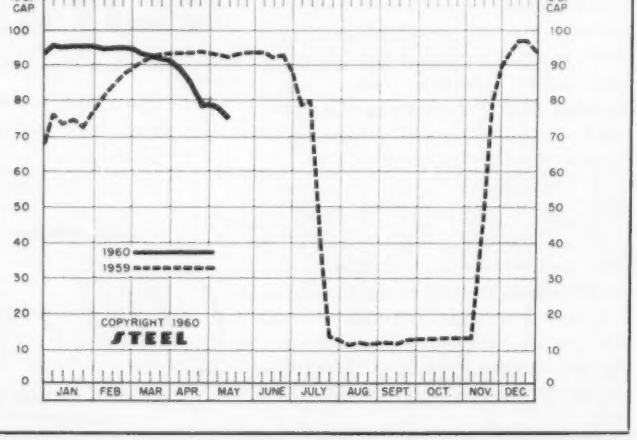
DISTRICT INGOT RATES

(Percentage of capacity utilized)

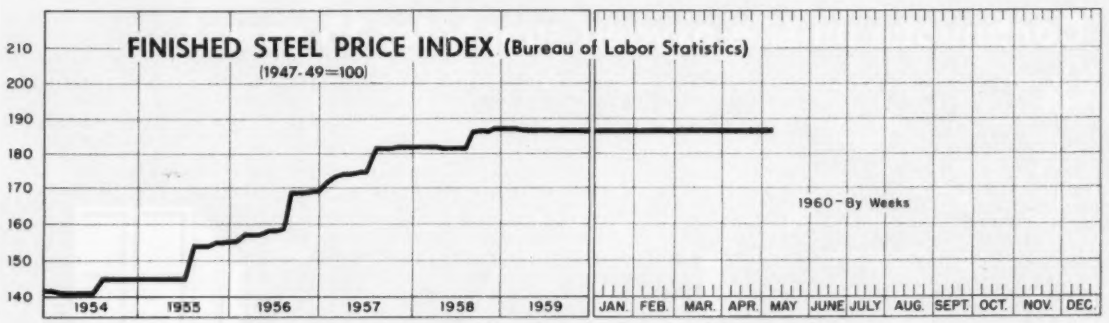
	Week Ended May 8	Week Ago	Month Ago	Year Ago
Northeastern	78	81	86	93
Buffalo	74	80	91	100
Pittsburgh	78	78	81	92
Youngstown	53	56	74	85
Cleveland	77	73	93	96
Detroit	94	100	90	95
Chicago	75	83	92	90
Cincinnati	83	82	102	87
St. Louis	90	85	103	106
Southern	78	79	80	92
Western	72	72	71	92
Total Industry ..	74.8	77.6	84.8	92.0
Index ..... (1947-49=100)	132.7	137.6	150.5	162.1
Net Tons .... (In thousands)	2,132	2,210	2,417	2,604

Current week's figures are preliminary. Weekly capacity (net tons): 2,849,306 in 1960 and 2,831,331 in 1959. Source: American Iron & Steel Institute.

NATIONAL STEELWORKS OPERATIONS



Price Indexes and Composites



May 3, 1960	Week Ago	Month Ago	Apr. Index	Year Ago
186.8	186.8	186.8	186.8	186.7

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended May 3

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloy, High Speed, W18 Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 302 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	6.385
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.765
Sheets, C.R., Stainless, 302 (lb)	0.658
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.489
Strip, C.R., Stainless, 430 (lb)	0.480
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.905
Pipe, Galv., Buttweld (100 ft)	23.585
Pipe, Line (100 ft)	199.533
Casing, Oil Well, Carbon (100 ft)	201.060
Casing, Oil Well, Alloy (100 ft)	315.213
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft)	205.608
Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (bundles)	7.967
Nails, Wire, 8d Common	9.825
Wire, Barbed (80-rod spool)	8.766
Woven Wire Fence (20-rod roll)	21.880

STEEL's FINISHED PRICE INDEX*

	May 4 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	194.53
Index in cents per lb	6.713	6.713	6.713	6.713	5.270

STEEL's ARITHMETICAL PRICE COMPOSITES*

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$118.45
No. 2 Fdry, Pig Iron, GT.	66.49	66.49	66.49	66.49	56.54
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	56.04
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	57.27
Steelmaking Scrap, GT	33.33	33.67	33.67	33.67	35.33

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL

	May 4 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.30
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.30
Bars, H.R., deld., Philadelphia	5.975	5.975	5.975	5.975	4.55
Bars, C.R., Pittsburgh	7.65*	7.65*	7.65*	7.65*	5.40
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.25
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.25
Shapes, deld., Philadelphia	5.77	5.77	5.77	5.77	4.53
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.225
Plates, Chicago	5.30	5.30	5.30	5.30	4.225
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.225
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.225
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.225
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	4.95
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.10
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.45
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.05
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.05
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	5.75
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	5.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	5.90
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	5.75
Nails, Wire, Pittsburgh	8.95	8.95	8.95	8.95	6.85
Tin plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.05

*Including 0.35c for special quality.

SEMIFINISHED STEEL

Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$78.00
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	6.40	6.40	6.40	6.40	4.675

PIG IRON, Gross Ton

	May 4 1960	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$57.00
Basic, Valley	66.00	66.00	66.00	66.00	56.00
Basic, deld., Philadelphia	70.41	70.41	70.41	70.41	59.66
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	56.50
No. 2 Fdry, deld., Phila.	70.91	70.91	70.91	70.91	55.16
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	52.88
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	60.58
Malleable, Valley	66.50	66.50	66.50	66.50	56.50
Malleable, Chicago	66.50	66.50	66.50	66.50	56.50
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	190.00

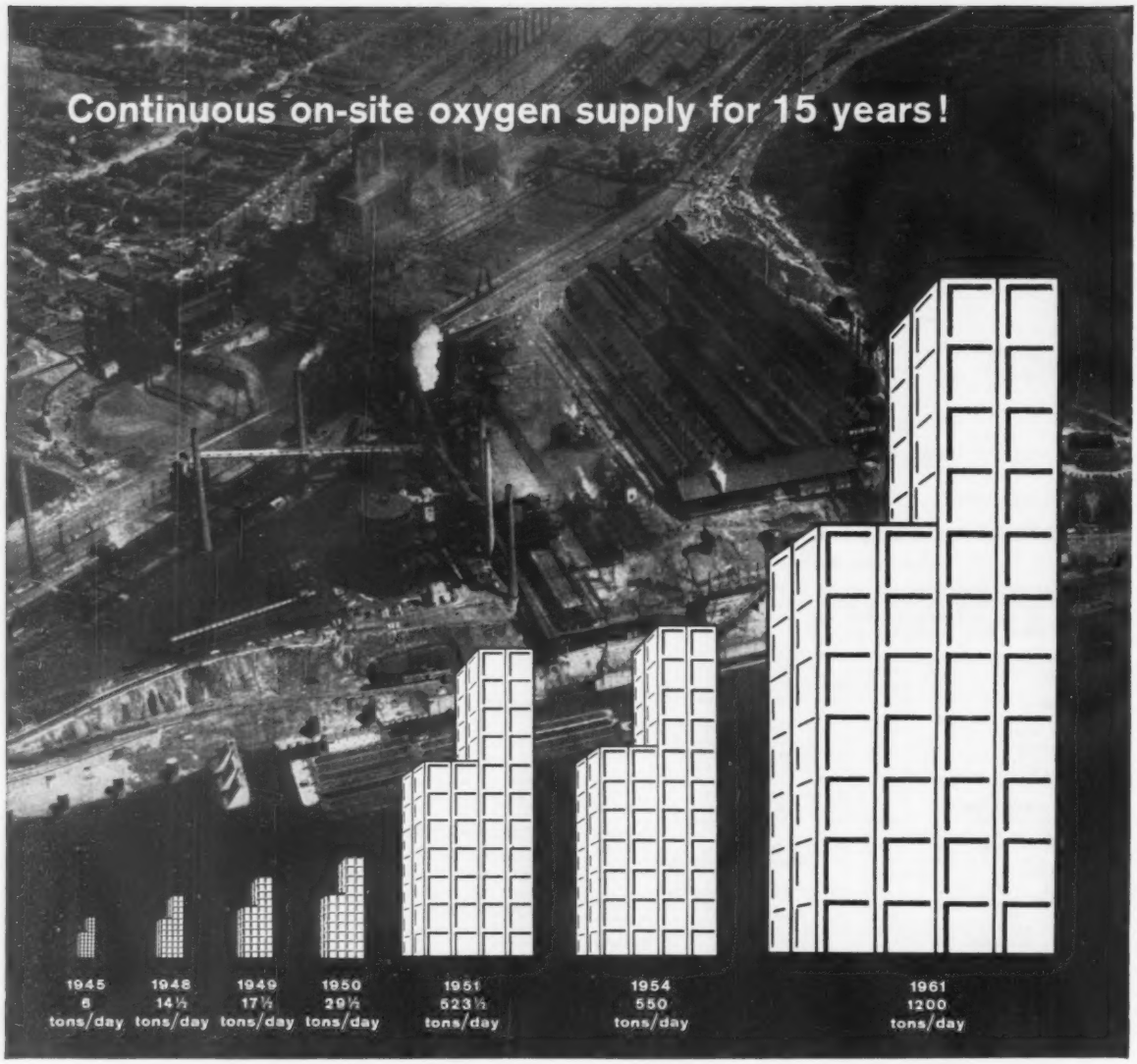
†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (including broker's commission)

No. 1 Heavy Melt, Pittsburgh	$33.50	$34.50	$34.50	$34.50	$35.50
No. 1 Heavy Melt, E. Pa.	35.00	35.00	35.00	33.50	36.50
No. 1 Heavy Melt, Chicago	31.50	31.50	31.50	33.00	34.00
No. 1 Heavy Melt, Valley	35.50	36.50	36.50	35.50	34.50
No. 1 Heavy Melt, Cleve.	32.50	33.50	33.50	33.50	31.50
No. 1 Heavy Melt, Buffalo	30.50	30.50	31.50	32.50	30.50
Rails, Rerolling, Chicago	52.50	53.50	53.50	56.50	52.50
No. 1 Cast, Chicago	42.50	45.50	45.50	46.50	40.50

COKE, Net Ton

Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$13.75
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.75
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	25.25



AGAIN! Weirton Steel calls on Air Products for reliable, low-cost oxygen

Air Products is now designing, building and installing a new on-site oxygen plant to meet expanded needs at Weirton Steel Company, a division of National Steel Corporation. The new facility will add 650 tons per day to Weirton's capacity, bringing it to 1200 tons per day. One of the first mills to take advantage of "on-location" oxygen generation, Weirton has long enjoyed the benefits of dependable, flexible, low-cost supply... puts oxygen profitably to work in many ways, including scarfing, blast furnace air enrichment, open hearth combustion and open hearth roof lancing.

Progressive steel companies across the nation have found Air Products on-site oxygen generators the key to making iron and steel faster at lower cost. Air Products long experience in supplying oxygen to the steel industry . . . plus continuous application research by our technical service department . . . assures practical, properly-sized plants and facilities tailored to the individual operating conditions, usage rates and future requirements of each mill. May we help *you* put oxygen to work? Air Products, Inc., Allentown, Pa.

Air Products
...INCORPORATED

Steel Prices

Mill prices as reported to STEEL, May 4, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 190, footnotes, page 192.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)
Munhall,Pa. U5 .....$76.00

INGOTS, Alloy (NT)
Detroit S41 .....$82.00
Economy,Pa. B14 .....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 .....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2 U5..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3..104.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 .....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 .....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. G8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5 W14 99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)
Bethlehem,Pa. B2 ..$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3.126.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ...119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2..119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 ....119.00
Massillon O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14 119.00
S.Duquesne,Pa. U5 ..119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)
Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2, W14 122.50
S.Duquesne,Pa. U5....122.50
Warren,O. C17.....122.50

SKELP
Aliquippa,Pa. J5 .....5.05
Benwood W.Va. W10....5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS
AlabamaCity,Ala. R2 ..6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 ..6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 ....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes
AlabamaCity,Ala. R2 ..5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1 5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.20
Minnequa Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14..5.50
S.SanFranciscoB3 .....6.15
Sterling,Ill. N15 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 .....5.50

Wide Flange
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ....5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N15 .....5.50
Weirton,W.Va. W6 .....5.50

Alloy Std. Shapes
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14..6.80

H. S., L.A., Std. Shapes
Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1 8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2..8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Seattle B3 .....8.80
S.Chicago Ill. U5, W14..8.05
S SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange
Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 .....8.05
S Chicago.Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES
Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ....5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ...5.50

STEEL SHEET PILING
Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ...6.50
Munhall,Pa. U5 .....6.50
S Chicago.Ill. I-2, U5 ...6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..5.30
Aliquippa,Pa. J5 .....5.30
Ash.and,Ky.(15) A10 ...5.30
Atlanta A11 .....5.50
Bessemer, Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. C22 ....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif(30) K1...6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 .....5.40
Harrisburg,Pa. P4 .....5.30
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1.5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B3 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.
Claymont,Del. C22 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron
Economy,Pa. B14 ....14.10

PLATES, H.S., L.A.
Aliquippa,Pa. J5 .....7.95
Ashland,Ky A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. C22 ....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1...8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y-1.7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago Ill. U5, W14..7.95
SparrowsPoint Md. B2...7.95
Warren,O. R2 .....7.95
Youngstown U5, Y1 .....7.95

PLATES, Alloy
Aliquippa,Pa. J5 .....7.50
Claymont,Del. C22 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S Chicago Ill. U5, W14..7.50
SparrowsPoint.Md. B2..7.50
Youngstown Y1 .....7.50

FLOOR PLATES
Cleveland J5 .....6.375
Conshohocken,Pa. A3...6.375
Ind.Harbor,Ind. I-2 ....6.375
Munhall Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

PLATES, Ingot Iron
Ashland c.l. (15) A10...5.55
Ashland l.c.l. (15) A10..6.05
Cleveland c.l. R2 .....6.05
Warren,O. R2 .....6.05

BARS

BARS, Hot-Rolled Carbon
(Merchant Quality)
Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa. (9) J5...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ...5.675
Birmingham(9) C15 ...5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ...5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ...5.675
Emeryville,Calif. J7 ..6.425
Fairfield Ala.(9) T2 ..5.675
Fairless,Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2...5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 ....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18...6.025
Milton Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Owensboro,Ky.(9) G8 ..6.025
Pittsburg,Calif.(9) C11 .6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ....5.675
Seattle(9) A24,B3.N15..6.425
S.Ch'c'go(9)R2,U5.W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 .....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11..6.375
Warren,O. C17 .....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy
Aliquippa,Pa. J5 .....6.725
Bethlehem,Pa. B2 .....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Fairless,Pa. U5 .....6.875
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 .....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6 975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2...6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6 725
Massillon,O. R2 .....6 725
Midland,Pa. C18 .....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 .....6.725
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14 6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R.
High-Strength, Low-Alloy
Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ...8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne Pa. U5 ....8.30
S SanFrancisco B3 .....9.05
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES: H.R. Carbon
Bethlehem,Pa. (9) B2..5.825
Houston(9) S5 .....5.925
KansasCity Mo.(9) S5..5.925
Lackawanna(9) B2 ....5 675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ..5 675

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES
Wrought Iron
Economy,Pa. B14 ....16.45

BAR SHAPES, H.I-Rolled Alloy
Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Loaded
(Including leaded extra)
Carbon
LosAngeles P2, S30....11.75*

Alloy
Ambridge,Pa. W18....10.175
BeaverFalls,Pa. M12..10.175
Camden N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 .....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12, R2..7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 ....7.65
Detroit B5, P17 .....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 .....7.65
GreenBay Wis. F7 .....7.65
Hammond,Ind. J5, L2..7.65
Hartford,Conn. R2 .....8.15
Harvey,Ill. B5 .....7.65
LosAngeles (49) S30....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2. R8 ...7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4...7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Carbon
(Turned and Ground)
Cumberland,Md.(5) C19 .6.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa.M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32...9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 ....9.025
Detroit B5, P17 .....9.225
Detroit S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5...9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 ....9.025
Hammond,Ind. J5. L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11 00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2. R8...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 ....9.225
S.Chicago,Ill. W14 ....9 025
SpringCity,Pa. K3 .....9.20
Struthers,O. Y1 .....9.025
Warren O. C17 .....9.025

Waukegan,Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.675
Birmingham C15 .....5.675
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 ....6.375
Ft. Worth,Tex(4)(26)T4 5.925
Gary,Ind. U5 .....5.675
Houston S5 .....5.925
Ind.Harbor,Ind. I-2,Y1.5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.925
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ...6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SandSprings,Okla. S5 ..5.925
Seattle A24, B3, N14..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Sterling,Ill.(1) N15 ....5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ..6.10
Torrance,Calif. C11 ...6.375
Youngstown R2, U5 ...5.675

BARS, Reinforcing, Billet (Fabricated: To Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.60
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5 ....7.60
Lackawanna,N.Y. B2 ...7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35
SandSprings,Okla. S5 ..7.60
Seattle A24, B3, N14 ..7.95
SparrowsPt.,Md. B2 ....7.33
St.Paul U8 .....8.17
Williamsport, Pa. S19 ...7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(staybolt)B14 .19.80
McK,Rks.(S.R.) L5 ....14.50
McK.Rks.(D.R.) L5 ...19.80
McK.Rks.(Staybolt)L5. 20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4)(44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ...5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 .....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 .....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ...5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ...5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14 ..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R., Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 ....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ..7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ....7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ....5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 ....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irvin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparrowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.475

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975•
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875•
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625•
Pittsburgh J5 .....6.875†
SparrowsPt.Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ..6.875•

•Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.625

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ...7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50
Youngstown J5 .....7.50

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom,W.Va.W10 7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225
Weirton,W.Va. W6 ....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Plant, Wickwire Spencer Steel Div., Colo. Fuel & Iron
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&FuelAssoc.
E2 Eastern Stainless Steel
E5 Elliott Bros. Steel Co.
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div. Merritt-Chapmann&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America

T2 Tenn. Coal & Iron
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope Corp.
U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet&Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala. City, Ala. (27) R2	5.10
Allenport, Pa. P7	5.10
Alton, Ill. L1	5.30
Ashland, Ky. (8) A10	5.10
Atlanta A11	5.10
Bessemer, Ala. T2	5.10
Birmingham C15	5.10
Conshohocken, Pa. A3	5.15
Detroit M1	5.10
Ecorse, Mich. G5	5.10
Fairfield, Ala. T2	5.10
Farrell, Pa. S3	5.10
Fontana, Calif. K1	5.825
Gary, Ind. U5	5.10
Ind. Harbor, Ind. I-2, Y1	5.10
Johnstown, Pa. (25) B2	5.10
Lackaw'na, N.Y. (25) B2	5.10
LosAngeles (25) B3	5.85
LosAngeles C1	8.60
Minnequa, Colo. C10	6.20
Riverdale, Ill. A1	5.10
SanFrancisco S7	6.60
Seattle (25) B3	6.10
Seattle N14	6.60
Sharon, Pa. S3	5.10
S. Chicago, Ill. W14	5.10
S. SanFrancisco (25) B3	5.85
SparrowsPoint, Md. B2	5.10
Torrance, Calif. C11	5.85
Warren, O. R2	5.10
Weirton, W. Va. W6	5.10
Youngstown U5	5.10

STRIP, Hot-Rolled Alloy

Carnegie, Pa. S18	8.40
Farrell, Pa. S3	8.40
Gary, Ind. U5	8.40
Houston S5	8.65
Ind. Harbor, Ind. Y1	8.40
KansasCity, Mo. S5	8.65
LosAngeles B3	9.60
Lowellville, O. S3	8.40
Newport, Ky. A2	8.40
Sharon, Pa. A2, S3	8.40
S. Chicago, Ill. W14	8.40
Youngstown U5, Y1	8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland, Ky. A10	7.575
Bessemer, Ala. T2	7.575
Conshohocken, Pa. A3	7.575
Ecorse, Mich. G5	7.575
Fairfield, Ala. T2	7.575
Farrell, Pa. S3	7.575
Gary, Ind. U5	7.575
Ind. Harbor, Ind. I-2, Y1	7.575
Lackawanna, N.Y. B2	7.575
LosAngeles (25) B3	8.325
Seattle (25) B3	8.575
Sharon, Pa. S3	7.575
S. Chicago, Ill. W14	7.575
S. SanFrancisco (25) B3	8.325
SparrowsPoint, Md. B2	7.575
Warren, O. R2	7.575
Weirton, W. Va. W6	7.575
Youngstown U5, Y1	7.575

STRIP, Hot-Rolled Ingot Iron

Ashland, Ky. (8) A10	5.35
Warren, O. R2	5.875

STRIP, Cold-Rolled Carbon

Anderson, Ind. G6	7.425
Baltimore T6	7.425
Boston T6	7.975
Buffalo S40	7.425
Cleveland A7, J5	7.425
Dearborn, Mich. S3	7.425
Detroit D2, M1, P20	7.425
Dover, O. G6	7.425
Evanston, Ill. M22	7.525
Farrell, Pa. S3	7.425
Follansbee, W.Va. W10	7.425
Fontana, Calif. K1	9.20
FranklinPark, Ill. T6	7.525
Ind. Harbor, Ind. Y1	7.425
Indianapolis S41	7.575
LosAngeles C1, S41	9.30
McKeesport, Pa. E10	7.525
NewBedford, Mass. R10	7.875
NewBritain, Conn. S15	7.875
NewCastle, Pa. B4, E5	7.425
NewHaven, Conn. D2	7.875
NewKensington, Pa. A6	7.425
Pawtucket, R.I. R3, N8	7.975
Philadelphia P24	7.875
Pittsburgh J5	7.425
Riverdale, Ill. A1	7.525
Rome, N.Y. (32) R6	7.425
Sharon, Pa. S3	7.425
Trenton, N.J. (31) R5	8.875
Warren, O. R2, T5	7.425
Worcester, Mass. A7	7.975

STRIP, Cold-Rolled Alloy

Boston T6	15.90
Carnegie, Pa. S18	15.55
Cleveland A7	15.55
Dover, O. G6	15.55
Farrell, Pa. S3	15.55
FranklinPark, Ill. T6	15.55
Harrison, N.J. S18	15.55
Indianapolis S41	15.70
LosAngeles S41	17.75
Lowellville, O. S3	15.55
Pawtucket, R.I. N8	15.90
Riverdale, Ill. A1	15.55
Sharon, Pa. S3	15.55
Worcester, Mass. A7	15.85
Youngstown S41	15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7	10.80
Dearborn, Mich. S3	10.80
Dover, O. G6	10.80
Farrell, Pa. S3	10.80
Ind. Harbor, Ind. Y1	10.80
Sharon, Pa. S3	10.80
Warren, O. R2	10.80
Weirton, W.Va. W6	10.80
Youngstown Y1	10.80

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol, Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie, Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn, Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover, O. G6	8.95	10.40	12.60	15.60	18.55
Evanston, Ill. M22	8.95	10.40	12.60	15.60	....
Farrell, Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria, O. S1	10.05	10.40	12.60	15.60	....
FranklinPark, Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison, N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain, Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle, Pa. B4, E5	8.95	10.40	12.60	15.60	....
NewHaven, Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington, Pa. A6	9.85	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket, R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale, Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome, N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon, Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton, N.J. R5	....	10.70	12.90	15.90	18.85
Warren, O. T5	8.95	10.40	12.60	15.60	18.55
Worcester, Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)

	0.80C	1.05C	1.35C
Bristol, Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria, O. S1	19.05	22.15	....
FranklinPark, Ill. T6	19.20	23.30	28.15
Harrison, N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer, Mass. W12	18.85	....	....
Trenton, N.J. R5	18.85	22.95	27.80
Worcester, Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

STRIP, Cold-Rolled Ingot Iron

Warren, O. R2	8.175

STRIP, C.R., Electrogalvanized

Cleveland A7	7.425*
Dover, O. G6	7.425*
Evanston, Ill. M22	7.525*
McKeesport, Pa. E10	7.50*
Riverdale, Ill. A1	7.525*
Warren, O. B9, S3, T5	7.425*
Worcester, Mass. A7	7.975
Youngstown S41, Y1	7.425*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Farrell, Pa. S3	7.50
Sharon, Pa. S3	7.50

TIGHT COOPERAGE HOOP

Atlanta A11	5.825
Farrell, Pa. S3	5.525
Riverdale, Ill. A1	5.675
Sharon, Pa. S3	5.525
Youngstown U5	5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa, Pa. J5	$9.10	$9.35	$9.75
Fairfield, Ala. T2	9.20	9.45	9.85
Fairless, Pa. U5	9.20	9.45	9.85
Fontana, Calif. K1	9.75	10.00	10.40
Gary, Ind. U5	9.10	9.35	9.75
GraniteCity, Ill. G4	9.20	9.45	9.60
IndianaHarbor, Ind. I-2, Y1	9.10	9.35	9.75
Irvin, Pa. U5	9.10	9.35	9.75
Niles, O. R2	9.10	9.35	9.75
Pittsburg, Calif. C11	9.75	10.00	10.40
SparrowsPoint, Md. B2	9.10	9.35	9.75
Weirton, W.Va. W6	9.10	9.35	9.75
Yorkville, O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)

Aliquippa, Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor, Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles, O. R2 (20-27 Ga.)	7.90	8.10	8.30

TIN PLATE, Hot Dipped

	Common Coke	1.25 lb	1.50 lb
Aliquippa, Pa. J5	$10.40	$10.65	
Fairfield, Ala. T2	10.50	10.75	
Fontana, Calif. K1	11.05	11.30	
Gary, Ind. U5	10.40	10.65	
Ind. Harb. Y1	10.40	10.65	
Irvin, Pa. U5	10.40	10.65	
Pitts., Calif. C11	11.05	11.30	
Sp. Pt., Md. B2	10.40	10.65	
Weirton, W.Va. W6	10.40	10.65	
Yorkville, O. W10	10.40	10.65	

BLACK PLATE (Base Box)

Aliquippa, Pa. J5	$8.20
Fairfield, Ala. T2	8.30
Fairless, Pa. U5	8.30
Fontana, Calif. K1	8.85
Gary, Ind. U5	8.20
GraniteCity, G4	8.30
Ind. Harbor, Ind. I-2, Y1	8.20
Irvin, Pa. U5	8.20
Niles, O. R2	8.20
Pittsburg, Calif. C11	8.85
SparrowsPoint, Md. B2	8.20
Weirton, W.Va. W6	8.20
Yorkville, O. W10	8.20

HOLLOWARE ENAMELING Black Plate (29 Gage)

Aliquippa, Pa. J5	7.85
Gary, Ind. U5	7.85
GraniteCity, Ill. G4	7.95
Ind. Harbor, Ind. Y1	7.85
Irvin, Pa. U5	7.85
Yorkville, O. W10	7.85

MANUFACTURING TERNES (Special Coated, Base Box)

Gary, Ind. U5	$10.05
Irvin, Pa. U5	10.05

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom, W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge, Pa. A4	....	....	12.40	13.55	14.65
GraniteCity, Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor, Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield, O. E6	9.875*	11.70	12.40	13.55	14.65
Newport, Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles, O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift, Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren, O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville, O. A10	....	11.70†	12.40	13.55	14.65

	Stator
Vandergrift, Pa. U5	8.10
Mansfield, O. E6	8.10
Warren, O. R2 (Silicon Lowcore)	8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom, W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift, Pa. U5	15.70	16.30	16.80	17.85
Zanesville, O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)

	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge, Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler, Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift, Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren, O. R2	....	....	....	....	....	15.70‡

*Semiprocessed, †Fully processed only. ‡Coils, annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity, Ala. R2	8.00
Aliquippa, Pa. J5	8.00
Alton, Ill. L1	8.20
Atlanta A1	8.00
Bartonville, Ill. K4	8.10
Buffalo W12	8.00
Chicago W13	8.00
Cleveland A7, C20	8.00
Crawfordsville, Ind. M8	8.10
Donora, Pa. A7	8.00
Duluth A7	8.00
Fairfield, Ala. T2	8.00
Fostoria, O. (24) S1	8.10
Houston S5	8.25
Jacksonville, Fla. M8	8.35
Johnstown, Pa. B2	8.00
Joliet, Ill. A7	8.00
KansasCity, Mo. S5	8.25
Kokomo, Ind. C16	8.10
LosAngeles B3	8.95
Minnequa, Colo. C10	8.25
Monessen, Pa. P7, P16	8.00
Palmer, Mass. W12	8.30
Pittsburg, Calif. C11	8.95
Portsmouth, O. P12	8.00
Rankin, Pa. A7	8.00
S. Chicago, Ill. R2	8.00
S. SanFrancisco C10	8.95
SparrowsPointMd. B2	8.10
Sterling, Ill. (1) N15	8.00
Sterling, Ill. N15	8.10
Struthers, O. Y1	8.00
Waukegan, Ill. A7	8.00
Worcester, Mass. A7	8.30

WIRE, Cold Heading Carbon

Elyria, O. W8	8.00

WIRE, Gal'd., for ACSR

Bartonville, Ill. K4	12.65
Buffalo W12	13.40
Cleveland A7	12.65
Donora, Pa. A7	12.65
Duluth A7	12.65
Johnstown, Pa. B2	13.40
KansasCity, Mo. U3	12.90
Minnequa, Colo. C10	12.775
Monessen, Pa. P7, P16	12.65
Muncie, Ind. I-7	13.60
NewHaven, Conn. A7	12.95
Palmer, Mass. W12	13.70
Pittsburg, Calif. C11	13.45
Portsmouth, O. P12	12.65
Roebling, N.J. R5	12.95
SparrowsPt., Md. B2	13.50
Struthers, O. Y1	13.40
Trenton, N.J. A7	12.95
Waukegan, Ill. A7	12.65
Worcester, Mass. A7	12.95

WIRE, Upholstery Spring

Aliquippa, Pa. J5	9.75
Alton, Ill. L1	9.95
Buffalo W12	9.75
Cleveland A7	9.75
Donora, Pa. A7	9.75
Duluth A7	9.75
Johnstown, Pa. B2	9.75
KansasCity, Mo. S5, U3	10.00
Kokomo, Ind. C16	9.85
LosAngeles B3	10.70
Minnequa, Colo. C10	9.95
Monessen, Pa. P7, P16	9.75
NewHaven, Conn. A7	10.05
Palmer, Mass. W12	10.05
Pittsburg, Calif. C11	10.70
Portsmouth, O. P12	9.75
Roebling, N.J. R5	10.05
S. Chicago, Ill. R2	9.75
S. SanFrancisco C10	10.70
SparrowsPt., Md. B2	9.85
Struthers, O. Y1	9.75
Trenton, N.J. A7	10.05
Waukegan, Ill. A7	9.75
Worcester, Mass. A7	10.05

WIRE, MB Spring, High-Carbon

Aliquippa, Pa. J5	9.75
Alton, Ill. L1	9.95
Bartonville, Ill. K4	9.85
Buffalo W12	9.75
Cleveland A7	9.75
Donora, Pa. A7	9.75
Duluth A7	9.75
Fostoria, O. S1	9.80
Johnstown, Pa. B2	9.75
KansasCity, Mo. S5, U3	10.00
LosAngeles B3	10.70
Milbury, Mass. (12) N6	10.05
Minnequa, Colo. C10	9.95
Monessen, Pa. P7, P16	9.75
Muncie, Ind. I-7	9.95
Palmer, Mass. W12	10.05
Pittsburg, Calif. C11	10.70
Portsmouth, O. P12	9.75
Roebling, N.J. R5	10.05
S. Chicago, Ill. R2	9.75
S. SanFrancisco C10	10.70
SparrowsPt., Md. B2	9.85
Struthers, O. Y1	9.75
Trenton, N.J. A7	10.05
Waukegan, Ill. A7	9.75
Worcester, Mass. A7, J4, T6	10.05

WIRE, Fine & Weaving (8" Coils)

Alton, Ill. L1	16.50
Bartonville, Ill. K4	16.40
Chicago W13	16.30
Cleveland A7	16.30
Crawfordsville, Ind. M8	16.40
Fostoria, O. S1	16.30
Houston S5	16.55
Jacksonville, Fla. M8	16.65
Johnstown, Pa. B2	16.30
KansasCity, Mo. S5	16.55
Kokomo, Ind. C16	16.30
Minnequa, Colo. C16	16.55
Monessen, Pa. P16	16.30
Muncie, Ind. I-7	16.50
Palmer, Mass. W12	16.60
S. SanFrancisco C10	17.15
Waukegan, Ill. A7	16.30
Worcester, Mass. A7, J6	16.60

WIRE, Tire Bead

Bartonville, Ill. K4	17.15
Monessen, Pa. P16	17.15
Roebling, N.J. R5	17.65

ROPE WIRE (A)

Bartonville, Ill. K4	13.45
Buffalo W12	13.45
Fostoria, O. S1	13.45
KansasCity, Mo. U3	13.70
Johnstown, Pa. B2	13.45
Monessen, Pa. P7	13.45
Muncie, Ind. I-7	13.65
Palmer, Mass. W12	13.75
Portsmouth, O. P12	13.45
Roebling, N.J. R5	13.75
St. Louis L8	13.45
SparrowsPt., Md. B2	13.55
Struthers, O. Y1	13.45
Worcester, Mass. J4	13.75

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7,T6	12.65

NAILS, Stock — **Col.**

AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	175
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10.	$10.10

POLISHED STAPLES — **Col.**

AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	177
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	175
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	177
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	181

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb Net Box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.44
Minnequa,Colo. C10	9.49
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.79
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.84
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop — **Col.**

AlabamaCity,Ala. R2	212
Atlanta A11	214
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
Pittsburg,Calif. C11	236
S.SanFrancisco C10	236
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS — **Col.**

Birmingham C15	177
ChicagoHts.,Ill. C2, I-2.	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed — **Col.**

AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	198§
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
S.SanFrancisco C10	213*
SparrowsPoint,Md. B2	195§
Sterling,Ill.(7) N15	198

WOVEN FENCE, 9-15 Ga. — **Col**

Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	192§
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(43) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE (16 gage)	**An'ld Galv. Stone**	**Stone**
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Cleveland A7	17.85	....
Craw'dville M8	17.95	19.80‡‡
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80‡‡
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
St'ling(37) N15	17.95	19.80
SparrowsPt. B2	17.95	19.75§
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

WIRE, Merchant Quality

(6 to 8 gage)	**An'ld Galv.**
Ala.City,Ala. R2	9.00 9.55**
Aliquippa J5	8.65 9.325§
Atlanta(48)A11	9.10 9.775§
Bartonville(48) K4	9.85 19.90
Buffalo W12	9.00 9.55†
Cleveland A7	9.00 ....
Crawfordsville M8	9.10 9.80††
Donora,Pa. A7	9.00 9.55†
Duluth A7	9.00 9.55†
Fairfield T2	9.00 9.55†
Houston(48) S5	9.25 9.80**
Jack'ville,Fla. M8	9.10 9.80‡‡
Johnstown(48) B2	9.00 9.675§
Joliet,Ill. A7	9.00 9.55†
KansasCity(48)S5	9.25 9.80**
Kokomo(48) S16	9.10 9.65†
LosAngeles B3	9.95 10.625§
Minnequa C10	9.25 9.80**
Monessen(48) P7	8.65 9.35§
Palmer,Mass. W12	9.30 9.85†
Pitts.,Calif. C11	9.95 10.50†
Rankin,Pa. A7	9.00 9.55†
S.Chicago R2	9.00 9.55**
S.SanFran. C10	9.95 10.50**
Spar'wsPt.(48)B2	9.10 9.775§
St'ling(37)(48)N15	9.10 9.80
Struthers,O. Y1	9.00 9.65‡
Worcester,Mass.A7	9.30 9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

FASTENERS

(Consumer discounts, per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nut 1⅛ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only—for package or bulk quantities use applicable list less bulk discounts.

HEXAGON NUTS, American Standard: Finished hex, hex jam, and hex slotted coarse or fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packages	43.75
Bulk	50

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packages	+55
Bulk	+16

Flat Head Cap Screws:

¾ in. and smaller, 6 in. and shorter:	
Packages	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam, 6 in. and shorter:	
Packages	+ 5
Bulk	+19
Through 1 in. diam., longer than 6 in.:	
Packages	+29

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85 $\frac{7}{16}$ in. and smaller by 6 in. and shorter: 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Alton,Ill. L1	$28.95	$43.40	$55.40	$73.00	$95.10
Buffalo W12	28.95	43.40	55.40	73.00	95.10
Cleveland A7	28.95	43.40	55.40	73.00	....
KansasCity,Mo. U3	29.85	43.00	55.40	73.00	95.10
Monessen,Pa. P16	32.15	48.20	61.55	81.10	105.65
NewHaven,Conn. A7	28.95	43.40	55.40	73.00	95.10
Pittsburg,Calif. C11	28.95	43.40	55.40	73.00	95.10
Minnequa,Colo. C10	28.95	43.40	55.40	73.00	95.10
Roebling,N.J. R5	28.95	43.40	55.40	73.00	95.10
SparrowsPoint,Md. B2	28.95	43.40	55.40	73.00	95.10
St.Louis L8	28.95	43.40	55.40	73.00	95.10
Waukegan,Ill. A7	28.95	43.40	55.40	73.00	95.10

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	53.17	40.26
2½	12	49.24	57.72	43.70
2¾	12	54.23	63.57	48.13
2½	12	58.73	68.83	52.13
2¾	12	62.62	73.40	55.59
3	12			

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.60	....	6.725
Easley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	6.875

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

SCREW SPIKES

Lebanon,Pa. B2	15.10

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(3) Merchant.
(4) Reinforcing.
(5) 1⅛ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(12) Worcester, Mass., base.
(15) ⅜" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 6.295c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds, 9.65c, over 3½ in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.72		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 13.00c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling Ingot	Rerolling Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	H.R. Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	31.25	42.00	43.75	47.00	49.50	45.75	55.00	55.00
304L	....	....	49.75	51.50	54.75	57.25	53.50	62.75	62.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.25	75.75	71.75	80.75	80.75
316L	....	....	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.00	65.50
330	....	....	123.25	....	113.00	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Specialty Wire Co. Inc.; Standard Tube Co., Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	48.90	59.55	70.15	80.55	....
Nickel	41.65	51.95	63.30	72.70	....
Nickel, Low Carbon	41.95	52.60	63.30	74.15	....
Monel	43.35	53.55	63.80	74.05	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	$36.80	$44.20

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	V-Cr Hot Work (H-13)	0.550
Spec. Carbon (W-1)	0.385	W-Cr Hot Work (H-12)	0.530
Oil Hardening (O-1)	0.505	W Hot Wk. (H-21)	1.425-1.44
V-Cr Hot Work (H-11)	0.505	Hi-Carbon-Cr (D-11)	0.955

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	..	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	....	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	69.02	69.52	69.52	70.02
Muskegon, Mich., deld.	....	74.52	74.52	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.50	76.00	....
Newark, N.J., deld.	72.69	73.19	73.69	74.19
Philadelphia, deld.	70.41	70.91	71.41	71.99
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), Aliquippa, deld.	....	67.95	67.95	68.48
McKees Rocks, Pa., deld.	....	67.60	67.60	68.13
Lawrenceville, Homestead, Wilmerding, Monaca, Pa. deld.	....	68.26	68.26	69.79
Verona, Trafford, Pa., deld.	68.29	68.82	68.82	69.35
Brackenridge, Pa., deld.	68.60	69.10	69.10	69.63
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Mansfield, Ohio, deld.	71.30	....	71.80	72.30
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Everett, Mass. E1	67.50	68.00	68.50	....
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	....	62.50‡	66.50	....
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 11.50%; starting with silicon over 11.50% add $1.50 per ton for each 0.50% silicon or portion thereof up to 14%; add $1 for each 0.50% Mn over 1%)

Jackson, Ohio I-3, J1	$78.00
Buffalo H1	79.25

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry, K2	89.00
Keokuk, Iowa O.H. & Fdry, 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	73.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Seattle, 10,000 lb and in San Francisco, 2000 to 4999 lb. City delivery charges are 15 cents per 100 lb except: Denver, Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, Spokane, San Francisco, 10 cents; Atlanta, Birmingham, Chattanooga, Houston, Seattle, no charge.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	8.53	8.66	10.06	....	10.94	9.33	11.80	16.38	9.92	9.15	10.50
Birmingham	9.43	10.20	10.46	....	10.41	9.09	13.14	16.76	9.00	9.29	10.90
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.80	9.95	11.15	55.98	10.65	9.00	11.45	16.30	9.65	9.00	10.85
Charlotte, N. C.	10.81	11.22	11.34	....	12.29	10.97	12.68	....	11.38	11.17	12.18
Chicago	8.74	10.20	10.95	53.00	10.40	8.84	10.65	15.95	9.33	8.67	10.46
Cincinnati	8.91	10.26	11.00	53.43	10.72	9.16	11.53	16.27	9.89	9.05	10.79
Cleveland	8.73	9.88	11.14	52.33	10.51	8.96	11.25	16.06	9.75	8.92	10.56
Dallas	9.47	10.30	12.59	....	11.03	8.88	12.98	16.95	9.11	9.20	10.87
Detroit	9.00	10.46	11.30	56.50	10.77	9.15	11.01	16.23	9.89	9.04	10.72
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.12	9.93	12.19	52.00	10.68	8.53	13.10	16.55	8.76	8.85	10.52
Indianapolis	9.18	10.64	11.39	....	10.84	9.28	11.09	16.39	9.77	9.11	10.90
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	9.95	11.55	12.20	57.60	11.55	9.75	14.20	17.35	10.00	10.00	11.85
Milwaukee	8.88	10.34	11.09	....	10.54	8.98	10.89	16.09	9.55	8.81	10.60
New York	9.36	10.13	11.35	53.08	11.46	9.74	13.25	16.40	10.20	9.51	11.05
Philadelphia	9.10	10.00	10.89	52.17	11.10	9.50	11.95	16.38	9.85	9.55	10.55
Pittsburgh	8.73	9.88	11.03	52.33	10.49	8.85	11.25	15.95	9.36	8.68	10.32
St. Louis	8.54	10.58	11.33	....	10.50	8.95	11.28	16.33	9.45	8.78	10.57
St. Paul	9.00	9.59	10.74	....	10.66	9.12	11.49	16.54	9.63	8.95	10.49
San Francisco	10.90	11.85	11.45	55.10	12.15	10.65	15.10	17.25	10.85	10.90	12.90
Seattle	11.55	12.30	12.50	56.52	12.65	11.10	16.20	17.80	11.20	11.00	13.10
Spokane, Wash.	11.55	12.30	12.50	57.38	13.15	11.60	16.20	17.80	11.20	11.00	13.60

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. x 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, ⅝ in.—2⅛ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅞ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, ¼ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $138; Cutler, Utah $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Vanport, Pa., Mexico, Vandalia, Mo., Wellsville, Irondale, New Salisbury, Ohio, $96.75; Clearfield, Pa., Portsmouth, Ohio, $102.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $253; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo. $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70*Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned, bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gidsonburg, Narlo, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅝ in. grains with fines: Baltimore, $73.

*—9 in. x 4½ x 2.50 straights.

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

Inches Diam	Inches Length	Per 100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5½	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron, Melting stock, 99.87% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c)	
Annealed, 99.5% Fe, ton, del. east of Mississippi	36.75,
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 98.1-98.9%, 2 to 20 microns, depending on grade, $6.00-$90.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 500-lb drum freight allowed, c.l.	38.50; ton lots 40.50
Antimony, 500-lb lots	42.00*
Brass, 5000-lb lots	35.10-52.20†
Bronze, 500-lb lots	53.10-56.70†
Copper, electrolytic	14.25*
Copper, reduced	14.25*
Lead	7.50*
Manganese, Electrolytic: Minus 35 mesh	$1.00
Nickel	$1.15
Nickel-Silver, 5000-lb lots	60.70-69.00†
Phosphor-Copper, 5000-lb lots	66.00
Copper (atomized) 5000-lb lots	46.50-64.50
Solder	7.00*
Silicon	70.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Tin	14.00*
Zinc, 5000-lb lots	21.20-34.40‡
Tungsten: Carbon reduced, 98.8% min., minus 65 mesh	Dollars nom.**
Chromium electrolytic 99.8% Cr. min., metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §Cutting and scarfing grade. **Depending on price of ore. ††Welding grade.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.90	$5.95	$5.80	$5.65	$6.05
Bar Size Angles	5.95	6.00	5.85	5.75	6.10
Structural Angles	5.86	5.91	5.76	5.66	6.01
I-Beams	5.86	5.91	5.76	5.66	6.01
Channels	5.86	5.91	5.76	5.66	6.01
Plates (basic bessemer)	5.98	6.03	5.88	5.78	6.13
Sheets, H.R.	7.50	7.55	7.40	7.30	7.65
Sheets, Galvanized, 20 Ga., 36 in. x 96 in.	9.70	9.75	9.60	9.50	9.85
Sheets, Galv. (in coils) 20 Ga., 48 in. wide	9.60	9.65	9.50	9.40	9.75
Furring Channels, C.R., 1000 ft. ¾ x 0.30 lb per ft	25.08	24.20	24.42	24.15	25.47
Barbed Wire (†)	6.50	6.55	6.40	6.30	6.65
Merchant Bars	6.39	6.44	6.29	6.19	6.54
Hot-Rolled Bands	7.90	7.95	7.80	7.70	8.05
Wire Rods, Thomas Commercial No. 5	6.60	....	6.45	6.45	6.70
Wire Rods, O. H.	7.05	....	6.90	6.90	7.15
Bright Common Wire Nails (‡)	7.80	7.85	7.50	7.60	7.95

†Per 82 lb net reel. ‡Per 100-lb keg. 20d nails and heavier.

Ores

Lake Superior Iron Ore

(Prices effective at start of the 1959 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer	$11.60
Mesabi nonbessemer	11.45
Old Range bessemer	11.85
Old Range nonbessemer	11.70
Open-hearth lump	12.70
High phos.	11.45

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1959, and increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

New Jersey, Concentrates	nom.

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 65%	21.00†
Brazilian iron ore, 68.5%	21.00

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$19.00-19.50
Domestic, concentrates, f.o.b. milling points	22.00-23.60

*Before duty. †Nominal.

Manganese Ore

Mn 46-48%, Indian, 88-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†

South African Transvaal

44% no ratio	18.00†
48% no ratio	24.00-26.00†

Turkish

48% 3:1	36.00-37.00†

Domestic

Rail nearest seller

18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo contents, mines, unpacked	$1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$2.50-2.75
60-65%	2.80-3.20

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

†Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace	$14.75-15.25
Connellsville, Pa., foundry	18.00-18.50

Oven Foundry Coke

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Detroit, ovens	32.00
Pontiac, Mich., deld.	33.95
Saginaw, Mich., deld	35.53
Erie, Pa., ovens	32.00
Everett, Mass., ovens:	
New England, deld.	33.55*
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.54
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.19
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.68
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

*Within $5.15 freight zone from works.

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene	31.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	*6.00*
Toluene, one deg. (deld. east of Rockies)	25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade	14.75

Per net ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton. Palmerton, Pa. 21-23% Mn, $102.50, 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50 as of Feb. 1. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.3c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: No. 1 (Cr 61-65%, C 5-7%, Si 5-8%), 22.00c.

Blocking Chrome: No. (Cr 61-65%, C 5-7%, Si 5-8%), 22.00c; No. 2 (Cr 58-63%, C 5-6%, Si 8-10%), 23.00c; No. 3 (Cr 58-63%, C 5-6%, Si 10-12%), 23.00c.

Refined Charge Chrome: No. 1 (Cr 50-55%, C 5% max, Si 2% max), 25.00c; No. 2 (Cr 56-60% C 5% max, Si 2% max), 25.00c.

Low-Carbon Ferrochrome: Cr 63-66% (Simplex), carload, lump, bulk, C 0.025% max, 31.50c per lb contained Cr; 0.010% max, 32.50c. Delivered.
Cr 67-71%, carload, lump, bulk, 0.025% max, 34.50c; 0.05% max, 33.50c; 0.10% max, 33.25c; 0.20% max, 33.00c; 0.50% max, 32.75c; 1.0% max, 32.50c; 1.5% max, 32.25c; 2.0% max, 32.00c. Delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%), C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). 8M x D, carload, bulk, 20.05c per lb of alloy carload packed, 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42.45%, C 0.05% max, 26.25c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 28.25c per lb contained Cr, 14.60c per lb contained Si; 0.75 in. x down 29.40c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot, packed, 2" x D plate (about ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1 $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.07% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lot, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52% Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3% lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l., packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb of briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload, bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). 5000 lb W or more $2.15 per lb (nominal) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-47% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

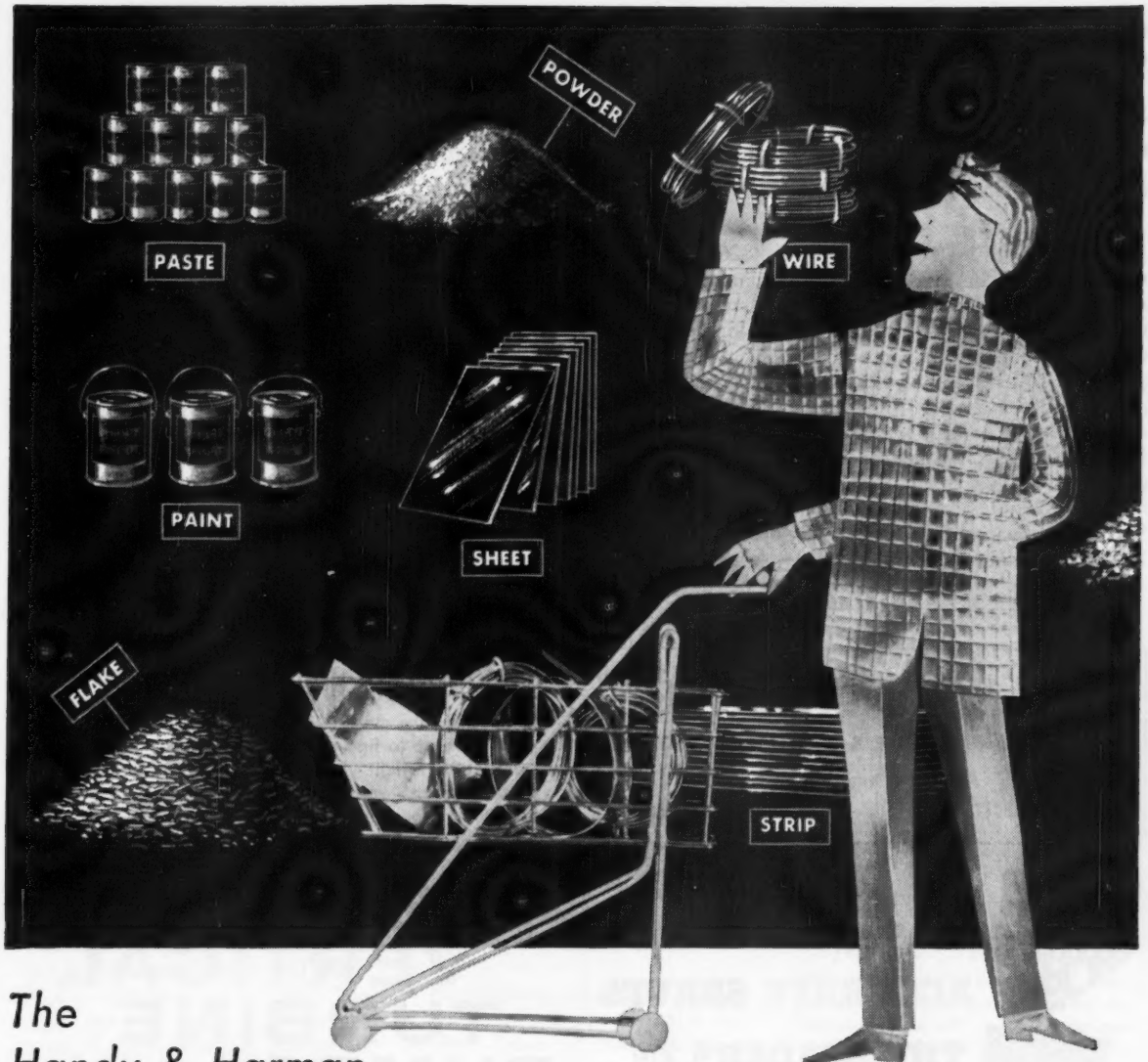
V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c, 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.



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Scrap Index Resumes Downtrend

STEEL's composite on No. 1 heavy melting slips 34 cents a ton to $33.33. Substantial mill buying is lacking, with steelmaking operations falling

Scrap Prices, Page 200

● **Pittsburgh**—The market is weak and may fall to lower levels before regaining strength. Brokers' bids on factory bundles from the local plant of GM's Fisher Body Div. averaged $37.25 a ton, $1.75 less than a month ago. A leading consumer bought No. 2 heavy melting scrap at the same prices it paid last month: $29 to local shippers and $31 to those with freight rates over $3. Prices paid for No. 2 bundles ($26 and $28, depending on shipping point) were $1 a ton higher than last month's.

Brokers for a mill on the fringe of the district paid dealers $34, delivered, for No. 1 heavy melting and $29 for No. 2 heavy melting. Both quotations were $1 a ton under last month's.

B&O Railroad sold its No. 1 heavy melting scrap for $36 (vs. $37.12 last month). Other grades, with the exception of wheels, were off about $2 a ton.

● **Chicago**—Slackening demand induced by the declining steel rate has weakened prices on a few grades. However, May offerings of No. 1 factory bundles at two auto stamping plants approximated $37 a gross ton, delivered.

● **Philadelphia**—The heavy export movement of scrap reported in April will continue through this month and may set a two-month record for this port. Much of the tonnage is being shipped to Japan, but European countries are showing more interest.

With domestic demand dull, the movement on foreign account is having a stabilizing effect on prices. The only change is a slight reduc-

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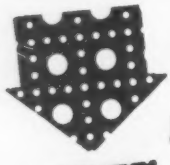

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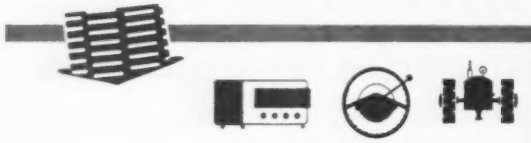

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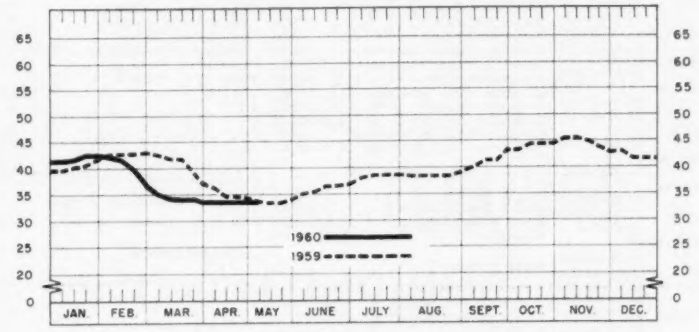
STEELMAKING SCRAP PRICE COMPOSITE

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania—Compiled by STEEL.



May 4 1960	Week Ago	Month Ago	Year Ago	Apr. Avg.
$33.33	$33.67	$33.67	$33.67	$33.67

tion in low phos structurals and plates, now quoted $38-$40 delivered.

• **New York**—Brokers' buying prices are unchanged. Dullness in domestic trade is offset some by brisk export demand.

• **Cleveland** — Steelmaking operations rose 4 points here but fell 3 points at Youngstown last week. There was a curtailment of blast furnace operations at both points, and some scrapmen are hoping the cut in hot metal output will result in a pickup in scrap buying. The mills are not taking much scrap, most of them holding substantial inventories. Prices are nominal, but a decline of $1 to $2 a ton is expected when buying is resumed.

• **Buffalo**—Area mills' scrap needs this month are expected to be smaller than in April, due to cuts in open hearth furnace operations. However, dealers don't anticipate much change in prices. Scrap is beginning to flow into this market via lake vessels from upper lake ports.

• **Cincinnati**—The market is off $1 a ton on the principal steelmaking grades, reflecting minimum May purchasing programs of local mills. No. 1 heavy melting is now quoted $29.50-$30.50. The steel mills hold substantial inventories, and they are using large quantities of hot metal.

• **St. Louis**—Prices continue to slip, with the mills showing no interest in offerings. Steelmaking operations are tending downward. The mills hold substantial inventories of scrap. Material continues to be generated, but the slow market is discouraging dealers and collectors. Prices were cut in most categories last week, declines averaging $2 to $3 a ton on the open hearth grades. No. 1 cupola cast went down $1 a ton, as did clean auto cast. Stove plate dropped $7, heavy breakable cast, $5, charging box cast, and unstripped motor blocks, $4.

• **Birmingham**—Cast scrap provides a bright spot in an otherwise dull market. Prices on that grade advanced $1 a ton last week. However, a number of the cast pipe manufacturing plants are closed by a strike. An open hearth steel consumer bought No. 2 bundles last week, $1 a ton down from the recently prevailing level. Brokers reduced their prices similarly. Generally, prices are nominal.

• **Houston**—Mill demand is at the lowest level of the year to date, but the market is steady with yard intake limited. Mexican purchases are providing some strength. The mill at Monterrey is setting the pace with a relatively high priced order—brokers are quoting $42 for low phos, $39 for No. 1 heavy melting, and $36 for No. 2 heavy melting, delivered, the border.

Exporters appear to be scrambling for No. 1 steel, offering $37-$38

(*Please turn to Page* 205)

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Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL, May 4, 1960. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

May 4	$33.33
Apr. 27	33.67
Apr. Avg.	33.67
May 1959	33.58
May 1955	34.87

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*33.00-34.00*
No. 2 heavy melting	28.00-29.00
No. 1 dealer bundles	*34.00-35.00*
No. 2 bundles	*25.00-26.00*
No. 1 busheling	*33.00-34.00*
No. 1 factory bundles	*39.00-40.00*
Machine shop turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Short turnings	22.00-23.00
Cast iron borings	22.00-23.00
Cut structurals:	
2 ft and under	*41.00-42.00*
3 ft and under	*40.00-41.00*
Heavy turnings	30.00-31.00
Punchings & plate scrap	*44.00-45.00*
Electric furnace bundles	*42.00-43.00*

Cast Iron Grades

No. 1 cupola	44.00-45.00
Stove plate	*44.00-45.00*
Unstripped motor blocks	32.00-33.00
Clean auto cast	47.00-48.00
Drop broken machinery	51.00-52.00

Railroad Scrap

No. 1 R.R. heavy melt.	*36.00-37.00*
Rails, 2 ft and under	*57.00-58.00*
Rails, 18 in. and under	*58.00-59.00*
Random rails	*51.00-52.00*
Angles, splice bars	*45.00-46.00*
Railroad specialties	47.00-48.00
Rails, rerolling	64.00-65.00

Stainless Steel Scrap

18-8 bundles & solids	215.00-220.00
18-8 turnings	115.00-120.00
430 bundles & solids	110.00-115.00
430 turnings	55.00-65.00

CHICAGO

No. 1 hvy melt., indus.	32.00-33.00
No. 1 hvy melt., dealer	30.00-31.00
No. 2 hvy melting	*27.00-28.00*
No. 1 factory bundles	36.00-37.00
No. 1 dealer bundles	31.00-32.00
No. 2 bundles	20.00-21.00
No. 1 busheling, indus.	32.00-33.00
No. 1 busheling, dealer	30.00-31.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	17.00-18.00
Shovel turnings	17.00-18.00
Cast iron borings	17.00-18.00
Cut structurals, 3 ft	*37.00-38.00*
Punchings & plate scrap	*38.00-39.00*

Cast Iron Grades

No. 1 cupola	*42.00-43.00*
Stove plate	*37.00-38.00*
Unstripped motor blocks	*36.00-37.00*
Clean auto cast	*50.00-51.00*
Drop broken machinery	*50.00-51.00*

Railroad Scrap

No. 1 R.R. heavy melt.	33.00-34.00
R. R. malleable	*48.00-49.00*
Rails, 2 ft and under	*51.00-52.00*
Rails, 18 in. and under	*52.00-53.00*
Angles, splice bars	*43.00-44.00*
Axles	51.00-52.00
Rails, rerolling	*52.00-53.00*

Stainless Steel Scrap

18-8 bundles, solids	*195.00-200.00*
18-8 turnings	*105.00-110.00*
430 bundles & solids	*90.00-95.00*
430 turnings	50.00-55.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	15.00-16.00
No. 1 bundles	29.00-30.00
No. 2 bundles	13.50-14.50
No. 1 busheling	26.00-27.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	10.00-11.00
Shovel turnings	9.00-10.00

Cast Iron Grades

No. 1 cupola	38.00-39.00
Stove plate	32.00-33.00
Heavy breakable	32.00-33.00
Unstripped motor blocks	24.00-25.00
Charging box cast	32.00-33.00
Clean auto cast	45.00-46.00

CLEVELAND

No. 1 heavy melting	*32.00-33.00*
No. 2 heavy melting	*23.00-24.00*
No. 1 factory bundles	*36.00-37.00*
No. 1 bundles	*32.00-33.00*
No. 2 bundles	*19.00-20.00*
No. 1 busheling	*32.00-33.00*
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	35.00-36.00
Cut structurals, plate 2 ft and under	43.00-44.00
Low phos. punchings & plate	34.00-35.00
Alloy free, short shovel turnings	17.00-18.00
Electric furnace bundles	*33.00-34.00*

Cast Iron Grades

No. 1 cupola	49.00-50.00
Charging box cast	33.00-34.00
Heavy breakable cast	35.00-36.00
Stove plate	44.00-45.00
Unstripped motor blocks	35.00-36.00
Brake shoes	35.00-36.00
Clean auto cast	52.00-53.00
Burnt cast	42.00-43.00
Drop broken machinery	54.00-55.00

Railroad Scrap

R.R. malleable	49.00-50.00
Rails, 2 ft and under	56.00-57.00
Rails, 18 in. and under	57.00-58.00
Rails, random lengths	49.00-50.00
Cast steel	42.00-43.00
No. 1 railroad cast	52.00-53.00
Railroad specialties	45.00-46.00
Angles, splice bars	45.00-46.00
Rails, rerolling	60.00-61.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	195.00-200.00
18-8 turnings	95.00-100.00
430 clips, bundles, solids	100.00-105.00
430 turnings	30.00-40.00

YOUNGSTOWN

No. 1 heavy melting	*35.00-36.00*
No. 2 heavy melting	*26.00-27.00*
No. 1 busheling	*35.00-36.00*
No. 1 bundles	*35.00-36.00*
No. 2 bundles	*22.00-23.00*
Machine shop turnings	15.00-16.00
Shovel turnings	20.00-21.00
Cast iron borings	20.00-21.00
Low phos.	37.00-38.00
Electric furnace bundles	*36.00-37.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*35.50-36.50*

BUFFALO

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	27.00-28.00
No. 1 bundles	30.00-31.00
No. 2 bundles	23.00-24.00
No. 1 busheling	30.00-31.00
Shovel turnings	21.00-22.00
Machine shop turnings	17.00-18.00
Cast iron borings	19.00-20.00
Low phos. structurals and plate, 2 ft and under	41.00-42.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	43.00-44.00
No. 1 machinery	48.00-49.00

Railroad Scrap

Rails, random lengths	44.00-45.00
Rails, 3 ft and under	50.00-51.00
Railroad specialties	41.00-42.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*29.50-30.50*
No. 2 heavy melting	*25.00-26.00*
No. 1 bundles	*29.50-30.50*
No. 2 bundles	*19.50-20.50*
No. 1 busheling	*29.50-30.50*
Machine shop turnings	*13.00-14.00*
Mixed borings, turnings	*13.00-14.00*
Shovel turnings	*16.00-17.00*
Cast iron borings	*16.00-17.00*
Low phos. 18 in.	*39.00-40.00*

Cast Iron Grades

No. 1 cupola	*39.00-40.00*
Heavy breakable cast	*35.00-36.00*
Charging box cast	*37.00-38.00*
Drop broken machinery	*50.00-51.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*34.00-35.00*
Rails, 18 in. and under	54.00-55.00
Rails, random lengths	*47.00-48.00*

PHILADELPHIA

No. 1 heavy melting	35.00
No. 2 heavy melting	31.00
No. 1 bundles	37.00
No. 2 bundles	22.00
No. 1 busheling	37.00
Electric furnace bundles	38.00
Mixed borings, turnings	19.00†
Shovel turnings	23.00†
Machine shop turnings	19.00†
Heavy turnings	29.00†
Structurals & plates	*38.00-40.00*
Couplers, springs, wheels	44.00
Rail crops, 2 ft & under	58.00-60.00

Cast Iron Grades

No. 1 cupola	41.00
Heavy breakable cast	43.00
Drop broken machinery	51.00-52.00
Malleable	55.00-56.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	31.00-32.00
No. 2 heavy melting	21.00-22.00
No. 1 bundles	31.00-32.00
No. 2 bundles	16.00-17.00
Machine shop turnings	7.00-8.00†
Mixed borings, turnings	8.00-9.00†
Shovel turnings	9.00-10.00†
Low phos. structurals & plates	38.00-39.00

Cast Iron Grades

No. 1 cupola	37.00-38.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	34.00-35.00

Stainless Steel

18-8 sheets, clips, solids	180.00-185.00
18-8 borings, turnings	90.00-95.00
410 sheets, clips, solids	55.00-60.00
430 sheets, clips, solids	70.00-75.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	26.00-27.00
No. 2 heavy melting	22.00-23.00
No. 1 bundles	26.00-27.00
No. 1 busheling	26.00-27.00
Machine shop turnings	6.00-7.00
Shovel turnings	11.00-12.00
No. 1 cast	39.00-40.00
Mixed cupola cast	33.00-34.00
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	*30.00-31.00*
No. 2 heavy melting	26.00-27.00
No. 1 bundles	*30.00-31.00*
No. 2 bundles	20.00-21.00
No. 1 busheling	35.00-36.00
Cast iron borings	12.00-13.00
Machine shop turnings	21.00-22.00
Shovel turnings	22.00-23.00
Bar crops and plate	*40.00-41.00*
Structurals & plate	*39.00-40.00*
Electric furnace bundles	35.00-36.00
Electric furnace:	
3 ft and under	33.00-34.00
2 ft and under	34.00-35.00

Cast Iron Grades

No. 1 cupola	*50.00-51.00*
Stove plate	*50.00-51.00*
Charging box cast	29.00-30.00
Unstripped motor blocks	*40.00-41.00*
No. 1 wheels	*42.00-43.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*34.00-35.00*
Rails, 18 in. and under	*47.00-48.00*
Rails, random lengths	*43.00-44.00*
Angles, splice bars	42.00-43.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	*31.00*
No. 2 heavy melting	*28.00*
No. 1 bundles	33.00
No. 2 bundles	*19.00*
No. 1 busheling	33.00
Machine shop turnings	*13.00*
Shovel turnings	*15.00*

Cast Iron Grades

No. 1 cupola	*47.00*
Charging box cast	*37.00†*
Heavy breakable cast	*35.00†*
Unstripped motor blocks	*35.00†*
Clean auto cast	*47.00*
Stove plate	*39.00†*

Railroad Scrap

No. 1 R.R. heavy melt.	*34.00*
Rails, random lengths	*41.00*
Rails, rerolling	54.00
Rails, 18 in. and under	46.00†
Angles, splice bars	*43.00†*

HOUSTON

(Brokers' buying prices; f.o.b. cars)

No. 1 heavy melting	34.00
No. 2 heavy melting	31.00
No. 2 bundles	19.00
Machine shop turnings	13.00-13.50
Low phos. plate & Low phos. plate & structurals	38.00-39.00

Cast Iron Grades

No. 1 cupola	35.00
Heavy breakable	27.00†
Foundry malleable	31.00†
Unstripped motor blocks	31.00-32.00

Railroad Scrap

No. 1 R.R. heavy melt.	34.00†

LOS ANGELES

No. 1 heavy melting	33.00
No. 2 heavy melting	30.00
No. 1 bundles	33.00
No. 2 bundles	17.00
Machine shop turnings	16.00
Shovel turnings	16.00
Cast iron borings	16.00
Cut structurals and plate 1 ft and under	43.00

Cast Iron Grades

No. 1 cupola	40.00-46.00

Railroad Scrap

No. 1 R.R. heavy melt.	39.00

PORTLAND, OREG.

No. 1 heavy melting	*35.00*
No. 2 heavy melting	*32.00*
No. 1 bundles	29.00
No. 2 bundles	*19.00*
Shovel turnings	16.00
Electric furnace bundles	43.00

Cast Iron Grades

No. 1 cupola	31.00
Heavy breakable	26.00
Unstripped motor blocks	24.00
Stove plate	21.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	32.00
No. 2 heavy melting	28.00
No. 1 bundles	28.00
No. 2 bundles	*19.00*
Machine shop turnings	15.00
Mixed borings, turnings	15.00
Electric furnace No. 1.	42.00

Cast Iron Grades

No. 1 cupola	30.00
Heavy breakable cast	25.00
Unstripped motor blocks	23.00
Stove plate (f.o.b. plant)	20.00

SAN FRANCISCO

No. 1 heavy melting	34.00
No. 2 heavy melting	30.00
No. 1 bundles	30.00
No. 2 bundles	20.00
Machine shop turnings	14.00
Mixed borings, turnings	14.00
Cast iron borings	14.00
Heavy turnings	14.00
Shovel turnings	14.00
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	44.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	40.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices)

No. 1 heavy melting	32.25
No. 2 heavy melting	28.25
No. 1 bundles	32.25
No. 2 bundles	20.00
Mixed steel scrap	24.25
Mixed borings, turnings	13.00
Busheling, new factory: Prepared	32.25
Unprepared	26.25
Shovel turnings	17.00

Cast Iron Grades‡

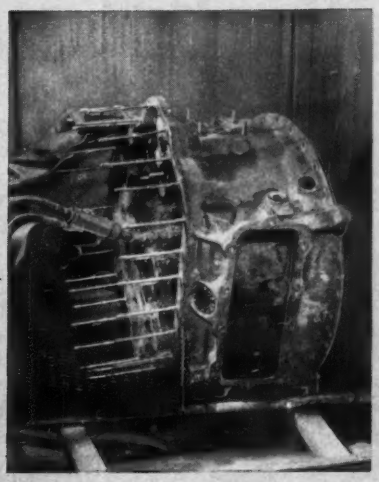
No. 1 machinery cast	46.50-48.00

†Nominal.
‡F.o.b. Hamilton, Ont.

PERFECTO-PEEN

HOW HIGH-VELOCITY* PEENING, CLEANING, FINISHING CUTS COSTS!

(*to 150 psi)



Perfecto-Peen's high-velocity (up to 150 psi) peening process cuts your costs because in one process you can stress relieve, work harden, clean and finish metals and metal products *faster* and *better.*

For example, the above casting required cleaning. Perfecto-Peening did that fast (see chart below.) In the same process, too, Perfecto-Peening cleaned and stress relieved threaded sections; it stress relieved machine surfaces; and produced a fine, uniform matte-satin finish.

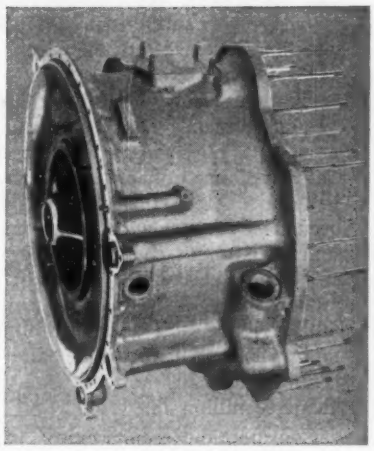
Perfecto-Peening did this without any limiting factors. No masking is required. Dimensional stability is maintained (true even for precision parts). There is no surface residue, no contamination.

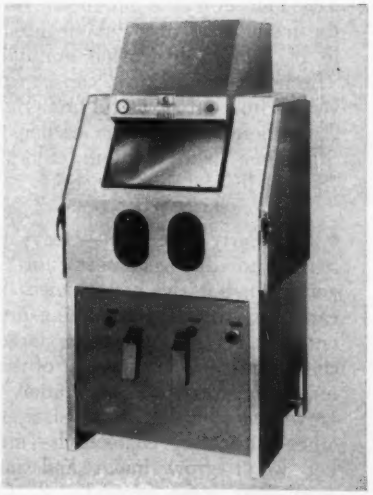
Compare these advantages with the limitations of other methods — manual, mechanical, blast or chemical — and you will realize, as many users already have, why high-velocity Perfecto-Peening is the ideal cost-saving method.

Perfecto-Peening uses various sizes of glass beads made from optical crown glass to provide impact resilience, purity and elasticity. Beads are suspended in a special slurry solution and blasted onto surfaces through a nozzle at high velocities up to 150 psi. (You can also use all types of wet blast material with no conversion kit required.)

To find out why many companies are now switching to Perfecto-Peening, write for our bulletin PPD-123. Better yet, send us a sample with your peening requirements and we will peen it without charge.

The Model A-50 machine is welded stainless steel construction. Operates on 110-v 60-cycle a-c and requires air pressure of 90 psi/50 cfm. Uses no pump but has sump to contain process slurry solution. Original set up time only 10 to 15 minutes, from empty machine to start of production. Custom machines designed and built for any production requirements.





LABORATORY TESTS IN CLEANING METAL PARTS UNDER FOLLOWING CONDITIONS

SURFACE CONDITION	AREA	CLEANING TIME
Corrosion, rust or equivalent	48 sq. in.	30-60 seconds
Carbon or equivalent	48 sq. in.	60-80 seconds
Deep oxide or equivalent	48 sq. in.	3 minutes

PERFECTO-PEEN

Division of: Aero-Test Equipment Company, Inc.

8401 CHANCELLOR ROW • P. O. BOX 10627 • DALLAS 7, TEXAS

New Lithium Markets Sought

The end of AEC contracts leaves a gap that has to be plugged by more penetration of the commercial market. Metalworking is being eyed as a prime customer

Nonferrous Metal Prices, Pages 204 & 205

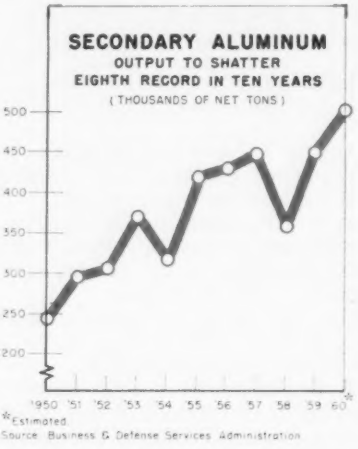
WITH THE LAST of the Atomic Energy Commission contracts fast expiring, the lithium industry is being forced to bet all its chips on expansion of the civilian and military (space and aircraft) markets.

It won't be an easy hand to play. The exact amount of lithium the AEC took for its classified projects has never been revealed, but the poundage was substantial. It'll take sometime to take up the slack.

• **Climbing Slowly** — The lightweight of metals has been around since 1910 but came into commercial acceptance only within the last 15 years. Since then growth has been steady but slow. Civilian consumption in this country (in terms of lithium carbonate) stood at 3 million lb in 1950 and grew to 6.2 million lb in 1957 and 7.7 million lb in 1958. This year, demand is running at an annual rate of about 8 million lb.

Consumption seems pretty slim when it's compared with capacity. The four domestic producers have the facilities to turn out 40 million lb of lithium hydroxide annually. The hydroxide, in turn, can be converted into other useful materials: 20 million lb of lithium carbonate, 6 million lb of lithium chloride, 780,000 lb of lithium metal.

• **Best Early Potentials**—Heavy research to discover new uses is going on, but the best chances for early growth lie in expanding present markets. Here are the largest civilian markets in the order of their importance and an evaluation of growth possibilities: 1. Greases and other lubricating compounds—market won't grow much and may even lose some ground. 2. Ceramics and glass—has the highest growth potential. 3. Chemical catalysts—promising in such areas as synthetic rubbers. 4. Industrial humidity control and air conditioning units—has second highest growth potential. 5. Metallurgical uses—should grow rapidly. 6. Storage batteries—not much growth foreseen. 7. Welding and brazing of aluminum—"iffy."



Producers think an aluminum-lithium aircraft alloy being used in a Navy fighter has potential, and at least one producer is enthusiastic about the possibilities of the use of lithium to remove impurities in stainless and mild steel melts—so far, it's limited. The metal also has promise in military aircraft and missile parts and as a rocket fuel.

• **Prices Stable**—Don't expect any rapid moves to lower the present price ($9 to $11 a pound). Demand will have to take a sharp upswing before producers can justify revisions.

In the Markets

• **Another Strike in Copper**—After but two months of labor peace, the world copper market has again been jolted by a strike. This time it's a walkout by workers at the Anaconda Co.'s 9000-ton-a-month El Salvador mine in Chile. The result should be a firming in the world market, a delay in international stock buildups, and a weakening of prices, which coppermen believe is inevitable in the next few months.

• **Cuban Nickel Talks Continue**—Freeport Nickel Co. is still holding talks with Cuban government officials while the State Department reportedly has taken over on negotiations involving Nicaro, but insiders are becoming increasingly gloomy about the fate of U. S. nickel interests on the island.

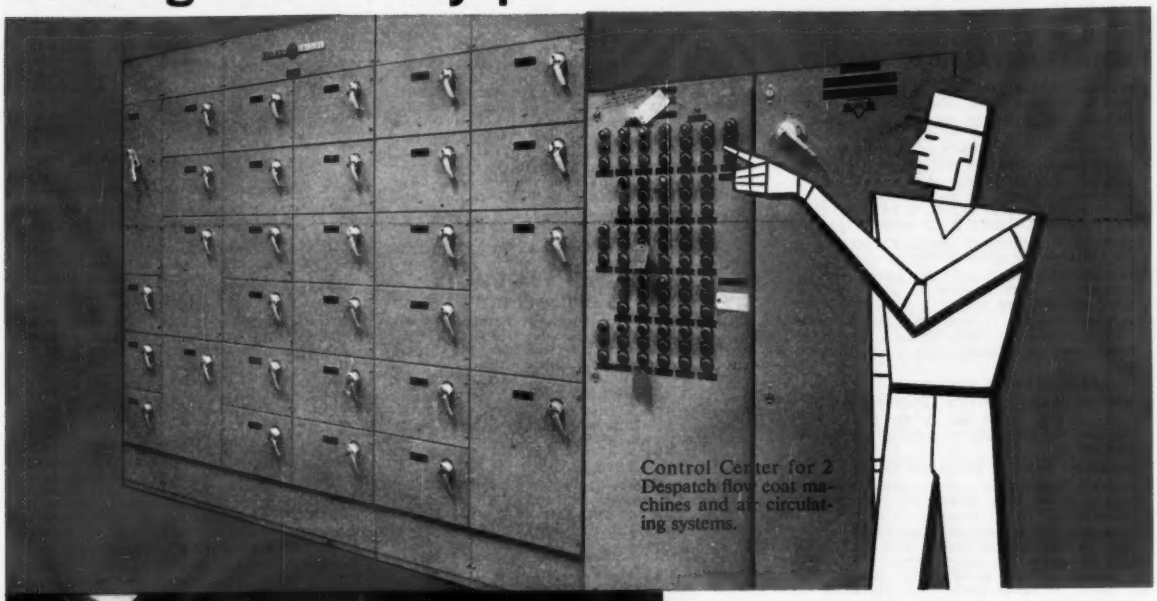
• **More Aluminum than Ever**—That's what the Business & Defense Services Administration sees for 1960. It estimates total domestic availability this year at 2,818,500 tons. Breakdown: Domestic primary production, 2,092,500 tons; primary imports, 217,500 tons; secondary recovery, 500,000 tons (see chart); and recovery from imported scrap, 8500 tons.

NONFERROUS PRICE RECORD

	May 4 Price	Last Change	Previous Price	Apr. Avg	Mar. Avg	May, 1959 Avg
Aluminum	26.00	Dec. 17, 1959	24.70	26.000	26.000	24.700
Copper	33.00	Mar. 10, 1960	33.00-35.00	33.000	33.296	31.750
Lead	11.80	Dec. 21, 1959	12.30	11.800	11.800	11.700
Magnesium	35.25	Aug. 13, 1956	33.75	35.250	35.250	35.250
Nickel	74.00	Dec. 6, 1956	64.50	74.000	74.000	74.000
Tin	99.375	May 4, 1960	98.875	99.260	100.227	103.080
Zinc	13.00	Jan. 8, 1960	12.50	13.000	13.000	11.000

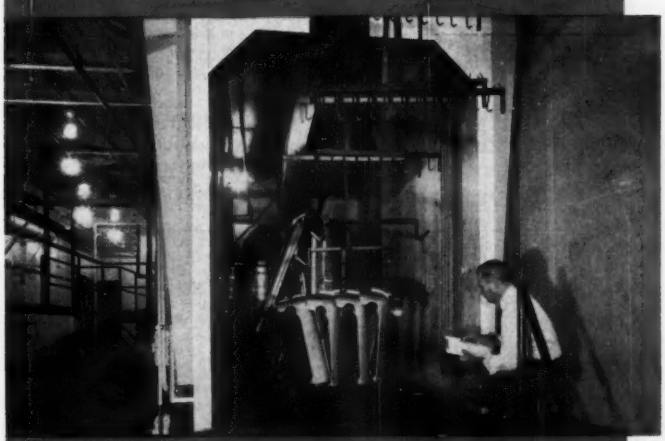
Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary pig, 99.5+%, f.o.b. customer custody; MAGNESIUM, pig, 99.8%, Velasco, Tex.

Herding more body parts down the finish line



Control Center for 2 Despatch flow coat machines and air circulating systems.

WASHED-TREATED Seven stages of ultra-efficient processing are provided by this sheet metal parts washer rustproofing machine, on auto makers body part assembly line.



FLOW COATED Parts enter one of the Despatch flow coat machines sequenced from the panelboard shown in top illustration. Drip area for this 40 ft. machine is 560 ft. long.

Modernization Speeds Production on 1960 Automobile Finishes with DESPATCH SYSTEM

Smoother, long lasting finishes are achieved with reduced labor costs in this recent Despatch installation. This up-to-date finishing system, manufactured and installed for a leading automobile producer, provides . . . better rustproofing . . . smoother more evenly coated application of paint or primer . . . more economical use of finishing materials . . . and reduces direct labor costs by introducing new efficiency and eliminating hand prefinishing operations.

Rarely are two finishing problems identical . . . yours may differ considerably from those faced by this major auto producer. A Despatch analysis of your finishing system can determine what system is best for your product. Despatch experience has been solving the finishing problems of industry since 1902. It will pay you to take advantage of a Despatch finishing analysis in your plant. Write today for new bulletin on Despatch engineered systems for modern finishing of metals.

DESPATCH OVEN CO.

DESPATCH OVEN COMPANY
611-8th Street S.E.
Minneapolis, Minnesota

Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, pigs, 26.00; ingots, 28.10, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.60; No. 43, 25.90; No. 195, 30.70; No. 214, 31.50; No. 356, 26.30, 30 lb ingots; 10 lb ingots, add 0.4 cent per lb; 6 lb ingots, add 0.6 cent per lb.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 25.00-26.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.50 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg, $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55-85 per lb nom.

Copper: Electrolytic, 33.00 deld.; custom smelters, 33.00; lake, 33.00 deld.; fire refined, 32.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $75-80 per troy oz nom.

Lead: Common, 11.80; chemical, 11.90; corroding, 11.90, St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 50 lb, $11 per lb f.o.b. Minneapolis; 50-99 lb, $10; 100-499 lb, $9.50; 500 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ81C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $213-215 per 75 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-7.0 in. diam., 50-4999 lb, $8.15-11.50 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel, 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; brick, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.00 per lb.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 99.375.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max.), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $2.75-2.90 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00; 99+% hydrogen reduced, $3.50-4.25.

Zinc: Prime western, 13.00; brass special, 13.25; intermediate, 13.00, East St. Louis, freight allowed over 0.50 per lb, New York basis, add 0.50. High grade, 14.50; special high grade, 14.75 deld. Diecasting alloy ingot No. 3, 16.50; No. 2, 17.00; No. 5, 16.75 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8 per lb; 100-500 lb, $7 per lb; over 500 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 27.25-29.00; No. 12 foundry alloy (No. 2 grade), 25.00-25.25; 5% silicon alloy, 0.60 Cu max., 25.50-26.50; 13 alloy, 0.60 Cu max., 25.50-25.75; 195 alloy, 27.75-28.75; 108 alloy, 25.25-25.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 25.50; grade 2, 24.25; grade 3, 23.25; grade 4, 22.75.

Brass Ingot: Red brass, No. 115, 29.25; tin bronze, No. 225, 39.50; No. 245, 34.00; high-leaded tin bronze, No. 305, 33.75; No. 1 yellow, No. 405, 23.75; manganese bronze, No. 421, 28.25.

Magnesium Alloy Ingot: A63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.975, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 38.35; l.c.l., 38.98. Weatherproof, 20,000-lb lots, 38.55; l.c.l., 39.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $17.50 per cwt; pipe, full coils, $17.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $4.00-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $12.50-19.20; H.R. strip, $12.50-22.90; C.R. strip, $15.90-31.25; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Widths (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.10-47.70
0.136-0.096	24-72	72-180	45.50-48.70
0.096-0.077	24-72	72-180	46.20-50.00
0.077-0.068	24-72	72-180	46.70-51.70
0.068-0.061	24-72	72-180	46.70-55.50
0.061-0.048	24-72	72-180	47.30-57.30
0.048-0.038	24-72	72-180	47.80-60.20
0.038-0.030	24-72	72-180	48.20-65.30
0.030-0.024	24-60	72-180	48.70-56.60
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-36	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; lengths, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	44.60	49.40
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 lb base, 12 ft

Diam. (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	72.90	75.80	....	....
0.188	....	....	....	78.20
0.250	58.00	61.60	70.70	72.30
0.375	57.20	62.40	69.00	70.50
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	57.20	62.40	69.00	70.50
0.625	57.20	62.40	65.80	66.60
0.750	55.70	60.70	59.60	62.60
0.875	55.70	60.70	59.60	62.60
1.000	55.70	60.70	59.60	62.60
1.125	53.30	58.30	57.50	60.40
1.250	53.30	58.30	57.50	60.40
1.375	53.30	58.30	57.50	60.40
1.500	53.30	58.30	57.50	60.40
1.625	51.00	55.60	....	58.20
1.750	51.00	55.60	56.30	58.20
1.875	51.00	55.60	....	58.20
2.000	51.00	55.60	56.30	58.20
2.250	49.50	54.00	....	58.20
2.500	49.50	54.00	....	58.20
2.750	47.90	52.20	....	58.20
3.000	47.90	52.20	....	58.20
3.250	....	52.20	....	....
3.375	....	52.20	....	....

*Selected sizes

Forging Stock: Round, Class 1, random lengths, diam., 0.375-8 in., "F" temper; 2014, 47.20-56.90; 6061, 43.20-56.90; 7075, 61.50-71.20; 7079, 66.50-76.20.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 31.55; 1¼ in., 42.75; 1½ in., 51.05; 2 in., 61.70; 3 in., 123.40; 4 in., 169.55; 5 in., 229.60; 6 in., 304.60; 8 in., 458.40; 10 in., 706.45 (3-24 ft lengths).

Extruded Solid Shapes:

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	44.70-46.20	53.20-59.00
15-17	44.70-46.20	55.60-60.80
18-23	45.20-46.80	57.70-66.40
24-32	45.20-46.80	65.60-78.80
33-38	48.80-51.40	82.30-93.40
39-44	58.70-62.40	99.90-121.00

MAGNESIUM

Sheets and Plates: AZ31B standard grade, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24-72 in. widths: .125 in., 74.90; .188 in., 71.70-72.10; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.0 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grade (AZ31B)
6-8	65.30-67.60	94.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.50-24.00; No. 2 heavy copper and wire, 20.75-21.25; light copper, 18.75-19.25; No. 1 composition red brass, 17.25-17.75; No. 1 com-

BRASS MILL PRICES

MILL PRODUCTS a

	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes
Copper	50.00b	54.86c	....	58.32
Yellow Brass	50.57	36.06d	50.86	54.23
Low Brass, 80%	53.53	53.22	53.82	57.09
Red Brass, 85%	54.58	54.27	54.87	58.14
Com. Bronze, 90%	56.17	55.86	56.46	59.48
Manganese Bronze	58.86	52.21	62.69	....
Muntz Metal	53.20	48.26	....	....
Naval Brass	55.12	48.68	61.43	58.78
Silicon Bronze	62.86	61.80	62.15	80.79
Nickel Silver, 10%	65.98	68.06	68.06	....
Phos. Bronze	77.44	78.19	77.69	79.37

SCRAP ALLOWANCES e (Based on copper at 30.00c)

	Clean Heavy	Rod Ends	Clean Turnings
Copper	29.000	29.000	28.250
Yellow Brass	22.250	21.250	20.250
Low Brass, 80%	24.750	24.500	24.000
Red Brass, 85%	25.750	25.500	25.000
Com. Bronze, 90%	26.750	26.500	26.000
Manganese Bronze	20.875	26.625	19.875
Muntz Metal	20.875	20.625	20.125
Naval Brass	20.750	20.500	20.000
Silicon Bronze	28.375	28.125	27.375
Nickel Silver, 10%	26.875	26.625	14.937
Phos. Bronze	29.875	29.625	28.625

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb.

position turnings, 15.75-16.25; new brass clippings, 14.50-15.00; light brass, 11.00-11.50; heavy yellow brass, 12.00-12.50; new brass rod ends, 12.50-12.75; auto radiators, unsweated, 13.00-13.50; cocks and faucets, 13.50-14.00; brass pipe, 14.00-14.50.

Lead: Soft scrap lead, 8.00-8.25; battery plates, 3.00-3.25; linotype and stereotype, 9.00-9.50; electrotype, 8.00-8.25; mixed babbitt, 9.00-9.50.

Monel: Clippings, 27.00-28.00; old sheets, 23.00-24.00; turnings, 20.00-22.00; rods, 27.00-28.00.

Nickel: Sheets and clips, 53.00-54.00; rolled anodes, 53.00-54.00; turnings, 41.00-42.00; rod ends, 53.00-54.00.

Zinc: Old zinc, 3.25-3.75; new diecast scrap, 4.00-4.50; old diecast scrap, 2.25-2.75.

Aluminum: Old castings and sheets, 11.50-11.75; clean borings and turnings, 7.25-7.50; segregated low copper clips, 14.50-15.00; segregated high copper clips, 12.50-13.00; mixed low copper clips, 14.00-14.50; mixed high copper clips, 12.50-13.00.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 12.00-12.50; clean borings and turnings, 9.00-9.50; segregated low copper clips, 16.00-16.50; segregated high copper clips, 15.00-15.50; mixed low copper clips, 15.00-15.50; mixed high copper clips, 14.50-15.00.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 11.25-11.75; clean borings and turnings, 10.00-10.50; segregated low copper clips, 15.00-15.50; segregated high copper clips, 14.00-14.50; mixed low copper clips, 14.00-14.50; mixed high copper clips, 13.50-14.00.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 59.00; light scrap, 54.00; turnings and borings, 39.00.
Copper and Brass: No. 1 heavy copper and wire, 27.00; No. 2 heavy copper and wire, 24.50; light copper, 22.00; refinery brass (60% copper) dry copper content, 22.75.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 27.00; No. 2 heavy copper and wire, 24.50; light copper, 22.00; No. 1 composition borings, 20.50; No. 1 composition solids, 21.00; heavy yellow brass solids, 15.25; yellow brass turnings, 14.00; radiators, 16.50.
(F.o.b. shipping point, freight allowed on quantities)

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.50.

Copper: Flat-rolled, 50.04; oval, 48.00, 5000-10,000 lb, electrodeposited, 42.00, 2000-5000 lb lots; cast, 44.50, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 1000 lb, 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 117.50; 200-499 lb, 116.00; 500-999 lb, 115.50; 1000 lb or more, 115.00.

Zinc: Balls, 20.50; flat tops, 20.50; flats, 23.25; ovals, 22.50, ton lots.

CHEMICALS

Cadmium Oxide: $1.50 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 16.00; 2000-5900 lb, 14 00; 6000-11,900 lb, 13.75; 12,000-22,900 lb, 13.50; 23.000 lb or more, 13.00.

Nickel Chloride: 100 lb, 45.00; 200 lb, 43.00; 300 lb, 42 00; 400-4900 lb, 40.00; 5000-9900 lb, 38.00; 10.000 lb or more, 37.00.

Nickel Sulphate: 5000-22.999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-800 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 78.00; 100-600 lb, 68.80; 700-1900 lb, 66.00; 2000-9900 lb, 64.10; 10.000 lb or more, 62.80.

Stannous Chloride (Anhydrous): 25 lb, 153.20; 100 lb, 148.30; 400 lb, 145.90; 800-19,900 lb, 105.00; 20,000 lb or more, 98.90.

Stannous Sulphate: Less than 50 lb, 138.40; 50 lb, 108.40; 100-1900 lb, 106.40; 2000 lb or more, 104.40.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page* 199)

for good sized tonnages in Beaumont, Tex., Baton Rouge, La., and New Orleans. The top price for that grade in Houston has been $36 on small buys.

• **Portland, Oreg.**—The market is a little firmer; prices on the principal grades advanced $3 a ton last week. No. 1 heavy melting is quoted at $35, No. 2 heavy melting at $32, and No. 2 bundles at $19.

• **Seattle**—No change is reported in scrap prices here, but dealers anticipate a revision shortly. They are hoping for an upturn, though turnover continues limited in the domestic market, and there's little export movement. Consumers' inventories are ample.

• **San Francisco**—Little mill buying of steel scrap is reported here. Exports are helping sustain the market. Reports are circulating of higher than posted prices being paid for steel scrap on quick deals to round out cargoes destined for Japan.

Pig Iron . . .

Pig Iron Prices, Page 194

Demand for pig iron is dropping rapidly. Consumption for steelmaking purposes reached a peak in January when the ingot rate hit 95.7 per cent. That compares with a current operating rate of around 77.6 per cent, a decline of about 18 points.

Consumption of merchant iron is dragging in most districts. A slight seasonal pickup has been noted at pipe shops, but improvement is lacking within other leading consuming industries. Forward buying is unnecessary with supplies ample for prompt shipment.

Blast furnace operators are reducing operations to prevent large buildup in stocks. U. S. Steel Corp. has taken out of production its No. 1 and E blast furnaces at South Works, Chicago. Of the district's 43 blast furnaces, only 32 are operating. With the exception of last year's strike period, this is the smallest number active since August, 1958, when the number was 27.

Republic Steel Corp. has blown out its No. 2 blast furnace at Youngstown, leaving only one blast furnace in operation at that plant. The firm banked a blast furnace at its Cleveland Works on Apr. 30.

Bethlehem Steel Co. has shut down one of seven blast furnaces at its Lackawanna, N. Y., plant for major repairs and the installation of new control equipment.

Merchant iron producers in that district have given no indication they plan to curtail production. They are busy shipping on the Great Lakes and are able to move a major portion of their current output to distant consuming points.

Freight rates on pig iron from Troy, N. Y., to most New England consuming points have been cut and the commodity rate has been canceled. This follows posting of lower freight charges on iron stored for reshipment from Beacon, N. Y.

Most users in the Northeastern section of the country are establishing new supply sources due to the depletion of stocks of Mystic iron at Everett, Mass.

CLASSIFIED

Miscellaneous For Sale

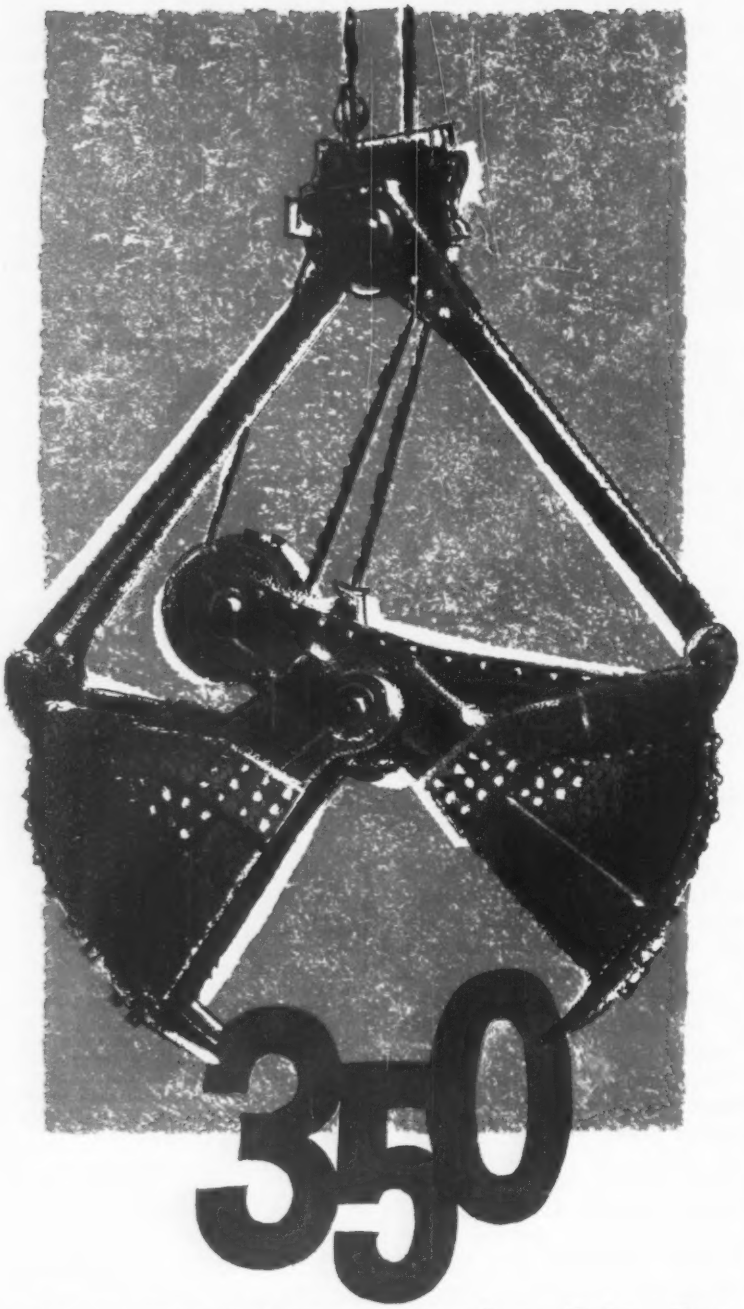
SALE OF VANADIUM PENTOXIDE, V_2O_5, fused. Sealed bids will be received at the Atomic Energy Commission, Grand Junction, Colorado, until 10:00 a.m., MST, on May 23, 1960, and publicly opened, for approximately 1,500,000 pounds of fused VANADIUM PENTOXIDE, V_2O_5, in 30 and/or 55 gallon steel drums. The twenty-two lots range from a low of about 42,000 pounds to a high of 102,000 pounds per lot, average size about 64,000 pounds. Specifications and invitations are available at U. S. Atomic Energy Commission, Grand Junction, Colorado, phone CHapel 3-2110, Ext. 446.

Help Wanted

SALES ENGINEER—One of our progressive, expanding divisions has an excellent opening in the Chicago area for a man qualified to sell clamshell buckets and grapples. This division manufactures an extensive line of buckets and grapples for the steel industry, industrial and contracting business. Qualifications: Prefer M.E. degree with sales experience along these lines. Craneway, crawler, overhead and locomotive type crane experience will be given consideration. Compensation: Salary — plus expenses — plus fringe benefits to include insurance, pension, savings and vacation. Send complete qualifications and salary desired to Blaw-Knox Company, 300 Sixth Avenue, Pittsburgh 22, Pa. J. J. Zimmerman.

Positions Wanted

Position Wanted: By top draftsman, neat, fast, accurate and practical in Ornamental, Miscellaneous Iron, Aluminum, Stainless Steel, Stair Work, Plate Work and Light Structural Steel. 32 years experience. Age 50 years. Very good references. Available within 30 days. Location preferred South or West. Reply Box 847, STEEL, Penton Bldg., Cleveland 13, Ohio.



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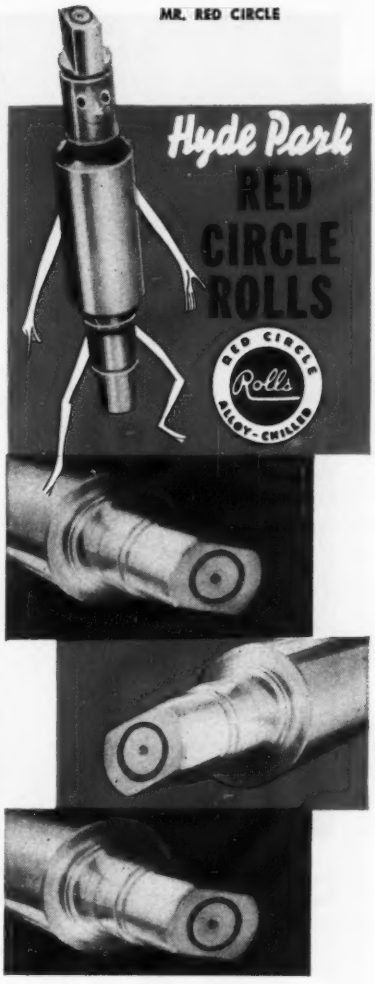

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Our engineers will be glad to work with you in the production of any special rolls or rolling mill equipment.

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Nickel Alloy Grain Rolls
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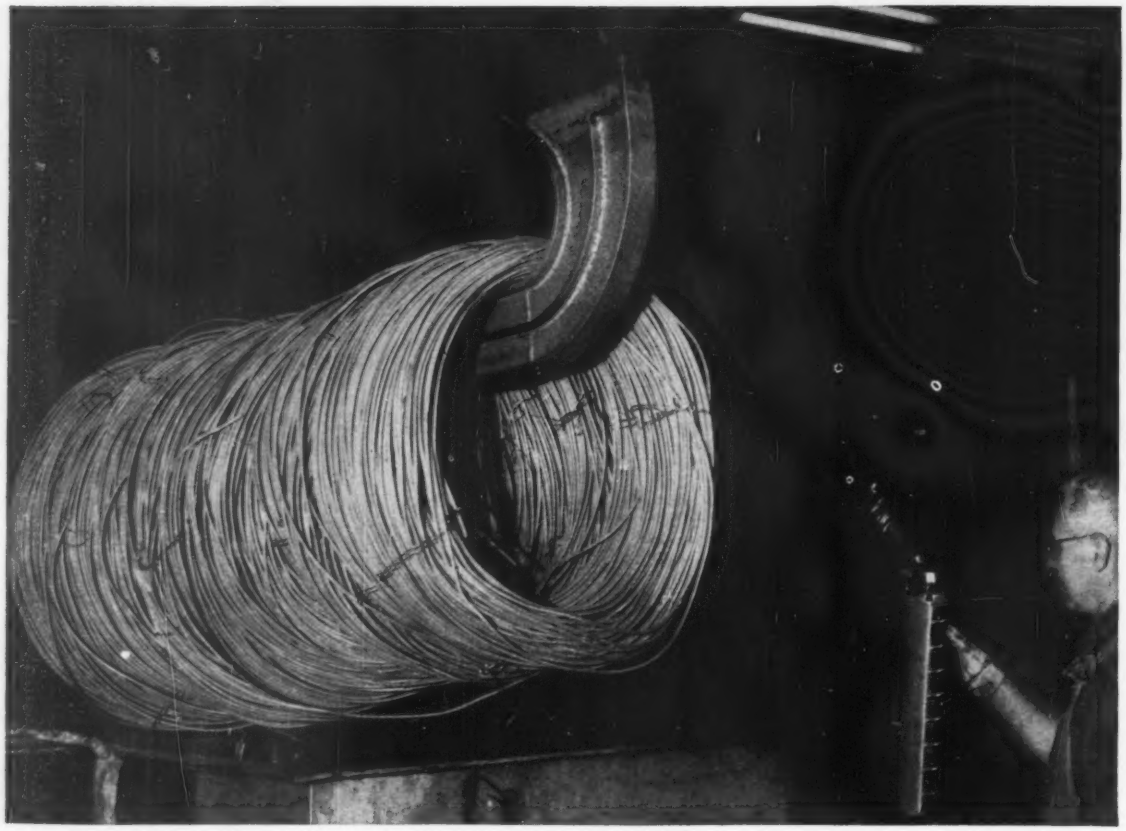
Rolls
Rolling Mill Equipment
Gray Iron Castings



Puzzle Picture:

Guess when Autolite installed this Monel pickling hook

Take a look . . . take a guess! Check the year you think this hook, designed and built by Youngstown Welding and Engineering, went into service:

—1948	—1949	—1950	—1951
—1952	—1953	—1954	—1955
—1956	—1957	—1958	—1959

The answer is *1948.* That's when The Electric Autolite Company installed six Monel alloy hooks at its Port Huron, Mich. plant . . . three of which are still in service, and doing fine. Dipping heavy loads into a 15% sulfuric acid bath at 120°F is ruinous service for most metals, but not for Monel* nickel-copper alloys. Average life for the six Monel hooks was 8 to 10 years. Average for the hooks used previously: about a year and a half.

Besides its outstanding corrosion resistance, Monel alloy offers a unique combination of strength, ductility, ease of fabrication. It's stronger than structural steel . . . tough and impact resistant . . . won't weaken by dezincifying. Result: bigger, more profitable payloads with less deadweight.

As much as 6300 pounds per lift is reported for Monel alloy hooks. That's because Monel alloy—strongest non-ferrous pickling equipment metal—withstands remarkably heavy bending forces with a generous safety factor. Hooks can be made lighter . . . without extra metal to offset corrosion.

It's easy to weld, form and fabricate parts made of Monel alloy . . . and repairs are no problem. Get all the benefits of Monel alloy in hooks, baskets, chains, slings . . . fastenings and tierods, too. Send for the useful 32-page booklet, "Equipping the Pickle House for Greater Production at Lower Cost." And let us know your problems with materials in corrosive service. Perhaps we can help you find good answers.

*Inco trademark

HUNTINGTON ALLOY PRODUCTS DIVISION
The International Nickel Company, Inc.
67 Wall Street New York 5, N. Y.

MONEL®

AIR-CUSHIONED

vibration

Finishes parts up to 100 times faster!

New Pangborn Air-Cushioned Vibratory Finishing Machine gives tremendous savings in finishing costs!

This is the 6 cu. ft. capacity Pangborn Air-Cushioned Vibratory Finishing Machine . . . perfect solution for cleaning, descaling, deburring, grinding, radiusing, fine-finishing, coloring or burnishing all metal and metal alloy parts, many suitable plastic and ceramic items.

- Works up to 100 times faster than conventional methods at lower cost.
- Most compact vibratory machine on the market.
- Air cushion suspension gives automatic leveling and amplitude control, supplants spring suspension systems subject to fatigue.
- Does work impossible to do by barrel finishing or other means.
- Standard basic machines are equipped with mechanically variable speeds.
- Floor vibration entirely eliminated, making possible (for the first time) second floor mounting.

Available in 1½, 3, 6, 12 and 18 cu. ft. net capacity sizes. Also auxiliary equipment, media and compounds for every need. Send parts with exact finish specifications, or finished specimen, for sample processing in our laboratory, to: Mr. William E. Brandt, PANGBORN CORPORATION, 1600 Pangborn Blvd., Hagerstown, Md.

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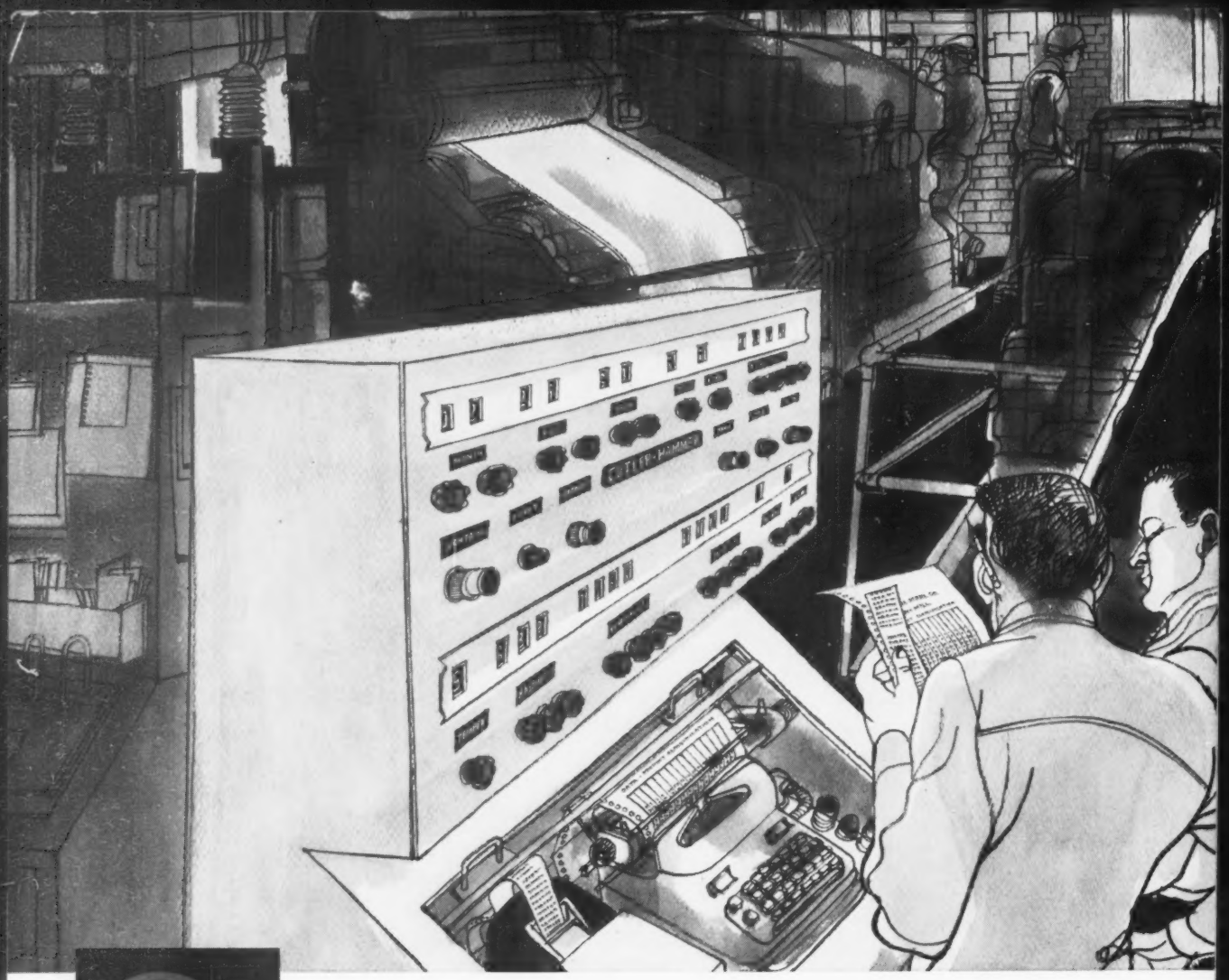

CONTROL

New machine with a memory licks a quality problem 3 miles long!

It's relatively simple to control quality of tinplate sheets by running them individually through sensing stations. But, how do you check and control quality in a *coil* of tinplate up to 16,000 feet long?

Working with a leading tinplate producer, Cutler-Hammer engineers devised an ingenious new type of computer that hooks right onto the sensing stations and automatically keeps track of every defect. When the tape is checked, production controls can be quickly adjusted to compensate for any deviation from standard.

This is an example of the new thinking, the new vitality at Cutler-Hammer. We're on the move . . . with new products, new ideas, new engineering talent. We've solved problems that other companies in our field wouldn't even tackle. One of our divisions, with extensive microwave and electronic experience, gives us even more creative muscle in all fields of industrial automation.

Even our trademark's new, to symbolize the new Cutler-Hammer. Phone one of our sales offices and see how we can fit on your team.

WHAT'S NEW? ASK...

CUTLER-HAMMER

CONTROL

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